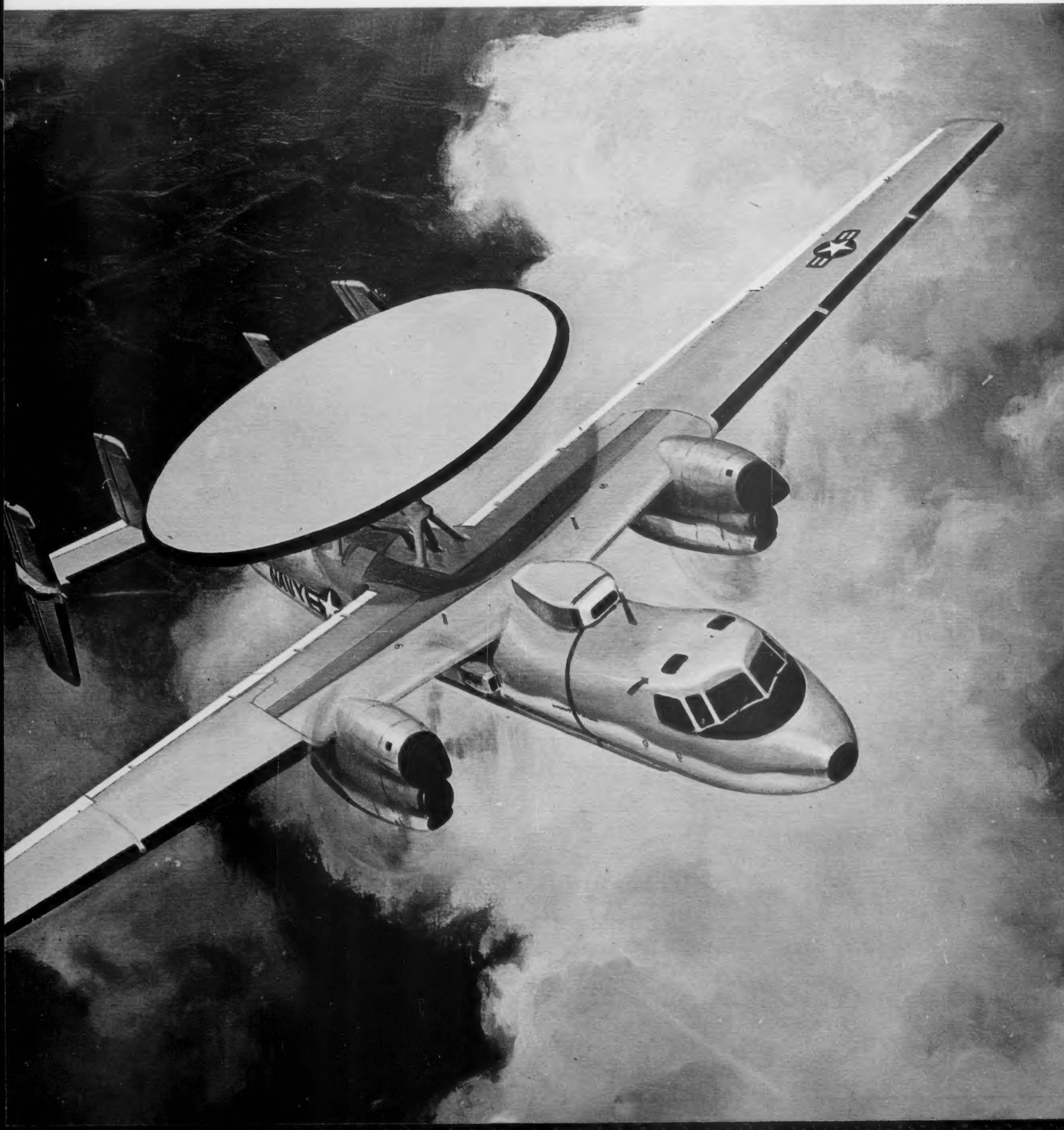
approach

JUNE 1978 THE NAVAL AVIATION SAFETY REVIEW



Thunderstorms

SOME months ago an S-3A, without radar, was tooling along the airways at FL260/360 knots TAS. The pilot was being vectored by Center to penetrate a 200-mile line of thunderstorms. The area of penetration was reported clear of thunderstorms by ATC, and was visually much lighter than surrounding areas.

The 1600Z forecast for the general area called for a few thunderstorms, tops 45,000 feet, moderate turbulence in cloud tops, and accompanying rain showers. The actual weather during penetration at 1830Z was an almost solid line of thunderstorms with tops estimated at 50,000 feet.

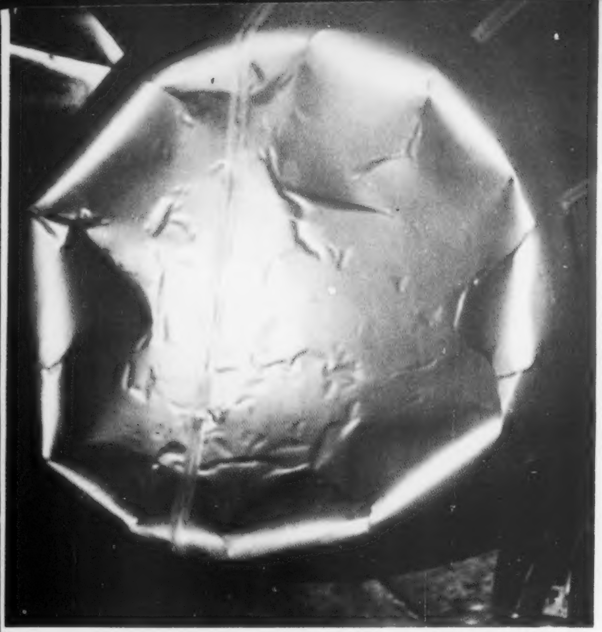
During penetration, the S-3A encountered an intense hailstorm accompanied by a rapid downdraft (4000 fpm). The S-3A was in the hail for only 5 seconds, but incurred about $45,000 worth of damage. When in the clear, the pilot slowed down, checked to make sure the aircraft was controllable, and landed at the nearest military airport.

The incident was just one of an annual average of 73 encounters between Navy aircraft and thunderstorms. Figure 1 shows an analysis of bouts between Navy aircraft and thunderstorms for a 5-year period between 1973-1977. There were 2 strikes, 1 substantial damage, and 131 other aircraft damaged. There were 7 fatalities, 11 major injuries, and 2 minor injuries to aircrewmen. Clearly, when you mix it up with a thunderstorm, the risks are high.

Thunderstorm Encounters

Type	'73	'74	'75	'76	'77	Damage				Injuries			Season			
A/C	Day/Night	Day/Night	Day/Night	Day/Night	Day/Night	A	C	D	E	Fatal	Major	Minor	Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec
All	45/13	63/15	55/15	56/22	72/8	2	1	3	128	7	11	2	89	97	116	62
													25%	26%	32%	17%

Fig. 1



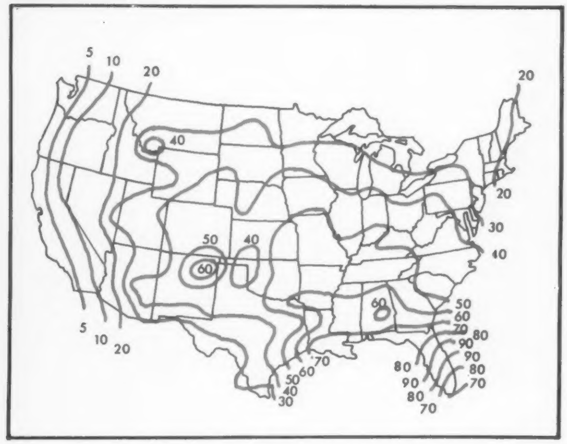


Fig. 2 Average number of thunderstorms each year.

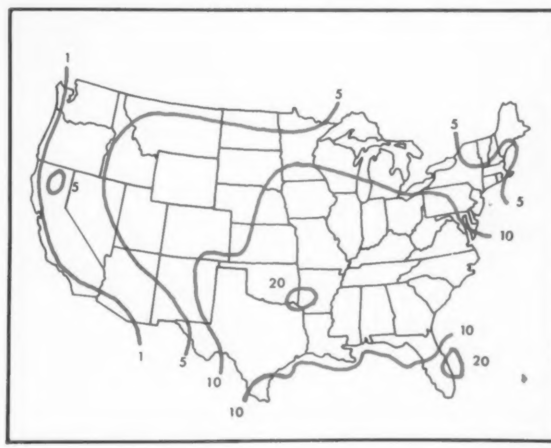


Fig. 3 Average number of days with thunderstorms during spring.

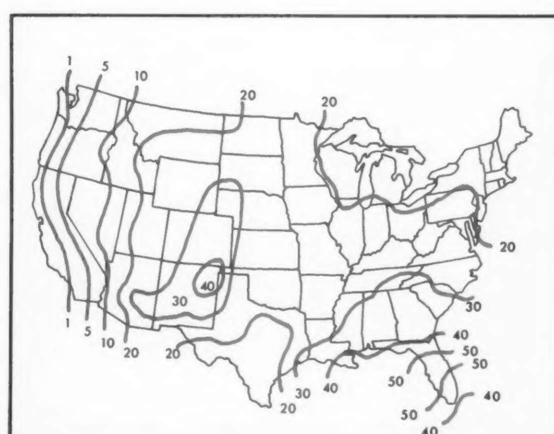


Fig. 4 Average number of days with thunderstorms during summer.

Nearly every model aircraft in the Navy inventory has been in the clutches of a thunderstorm during the 5-year period. But the P-3 was far and away the leader with 119 encounters. The next four models most frequently involved were: 34 by S-3As, 30 by A-4s, 29 by A-6s, and 21 by T-2s.

Not all encounters between aircraft and thunderstorms were airborne. For example, a C-131 was parked on the flight line one night. At 1630, thunderstorm Condition II was set, and at 2230, Condition I was set. Air station personnel routinely, as a preventive measure, had prepared all aircraft on the line for daily thunderstorm conditions.

When the air station went into Condition I, the C-131 was secured with eight 8700-pound nylon straps instead of seven 2650-pound manila lines. Most readers would agree that any aircraft so secured could ride out any blow. Not so. About 2250, winds rose to 320/65 knots, a tail fitting separated under stress, four straps failed, and the aircraft (parked on a heading of 110 degrees) jumped the chocks and weathercocked around to 310 degrees. When the tail fitting tore loose, it ripped off a piece of aircraft skin about a foot long.

Make no mistake, we are at the height of the thunderstorm season and will be in the worst of it for the next 3 to 4 months. Thunderstorms do occur year 'round, but the greatest frequency is May through September. Figures 2 through 4 depict the yearly average number of thunderstorms and the average number of thunderstorm days during spring and summer. The figures have been reproduced from *Aviation Weather,* AC 00-6A, published jointly by FAA and NOAA.

Let's take a look at these harbingers of damage, injury, and occasional catastrophes. It's widely acknowledged that the life cycle of thunderstorms consists of three stages. The *cumulus stage* is the start in which vertical flow is upward

and flight through them is characterized by a gain in altitude and some bumps. The growth rate (swelling) may exceed 3000 fpm. Pilots beware of icing in the developing stage of the cumulus cloud above the freezing level. The *mature stage* is the second stage in which more vapor condenses, the cloud swells, rain falls out of the bottom, vertical currents are both up and down, and through flight is characterized by extraordinary drafts (6000 fpm), gusts, lightning, turbulence, and hail. The *dissipating stage* is the last stage in which vertical flow is downward, turbulence becomes less severe, precipitation diminishes, and finally only harmless clouds remain. Two depictions of a typical mature thunderstorm are shown.

Individual thunderstorms vary in size from a couple of miles to as much as 25 to 30 miles in diameter, and tops can vary from 25,000 to 65,000 feet. The life of a storm can vary from 1 to 2 hours for air mass thunderstorms to several hours for steady state thunderstorms.

Air mass thunderstorms are of the local, duty type which spring up due to surface heating, just in time to drive the garden party for the CO indoors. They may last for 15 to 20 minutes, but usually not much longer than an hour. They reach maximum intensity in the afternoon over land masses and at night over water.

Steady state thunderstorms usually accompany weather systems. They last much longer and contain unbelievable

violence. They spawn line squalls, funnel clouds, water spouts, and tornadoes. There is NO way an aircraft caught in any of these can avoid structural damage. Even worse, there have been instances on record when aircraft literally have been torn apart. Photographs of some of these conditions are reproduced from *Aviation Weather*.

Every effort should be made to avoid encounters with thunderstorms. However, if you have to penetrate one, the selection of a flight altitude, route, and pilot technique that will give the best chance for success is paramount. Generally, the "safest" altitude to crack a thunderstorm is in the bottom third – 4000 to 5000 feet above the terrain. It is possible to get through above 20,000 feet and get into the clear with the aircraft still strapped to your back, but this route risks *severe* turbulence and hail. By any route, you'd better have radar or some ground radar operator giving you vectors through the worst areas.

At the risk of being too basic, let's review what pilots can do to prepare for the r-o-u-g-h ride. Reduce your airspeed and configure your aircraft as recommended by NATOPS. Tighten your straps and ensure that all loose objects in the aircraft are secured. Turn on pitot and carburetor heat, if applicable. Turn up cockpit lighting. Get on the gages and think and fly *attitude*. If your aircraft gains and loses altitude, let 'er go! Maneuvering to hold altitude is an invitation to overstress the aircraft and can even cause control failures. It's assumed you've picked the shortest way through and the lightest areas, so maintain heading and limit any heading changes to the bare minimum. If that bird comes unglued or starts shedding parts, there's nothing left but a nylon descent – and that's another story!

Most of this dissertation has been concerned with airborne encounters between aircraft and thunderstorms. There is one other condition we want to address – the situation when you want to take off or land with a thunderstorm in proximity to the airport. *DON'T!*

The downdrafts in heavy rain below the base of the clouds frequently constitute a hazard. The downdrafts possess such downward force that an aircraft might be displaced by 1000 to 1500 feet. Surface wind fluctuations may be as strong as the gusts within the thunderstorm itself. Gusts as much as 20 feet per second are not unusual, and turbulence in the lowest few hundred feet may be severe.

In view of this, the best bet is to delay takeoffs and landings, when there's a choice, until the thunderstorm has moved off. Let's take a look at an example of both a landing and takeoff with a nearby thunderstorm.

An A-4 pilot lined up on centerline of Runway 22. The wind was reported as 140/8 knots. After 500 feet of roll, the wind gusted to 22 knots. The pilot had not had any report of gusts. The aircraft began to float, fishtail, and weathercock. The roll developed into a curve to the right, a right yaw of 20 degrees, and the pilot aborted. He dropped the hook, caught an arresting wire (20 feet from the right side) at the 1500-foot mark, departed the runway, traveled 100 feet into the dirt (almost flipping over), and finally stopped after a roll of 325 feet, 55 feet abeam the runway.

An A-6 pilot was en route to his destination at FL260 in solid IMC. He experienced continuous turbulence and rain. His radar was out, and he requested Center to give him vectors as necessary. In a period of about 10 minutes, his aircraft was hit twice by lightning strikes. Even though he received vectors he encountered heavy rain, hail, and moderate turbulence for about 2 minutes. Then, as if that wasn't enough, he started picking up rime ice.

The pilot was cleared to start descent and was advised that the current airport weather was thunderstorm overhead, heavy rain, partial obscuration, 1 to 2 miles visibility, and winds were 270/14 with gusts to 34. Low fuel dictated that he continue his approach and land. After touchdown, when he had slowed to 50 knots, the aircraft slid rapidly right, and the starboard main gear blew. The A-6 departed the runway after skidding 1500 feet and came to rest in mud up to the wheel hub. The starboard brake had locked and the wheel assembly was ground down on the runway. Both engines had been FODed by accumulated ice from the radome.

To sum up this article, take a minute or two to study the following thunderstorm profile. The whole story of a thunderstorm is right before you.

Continued

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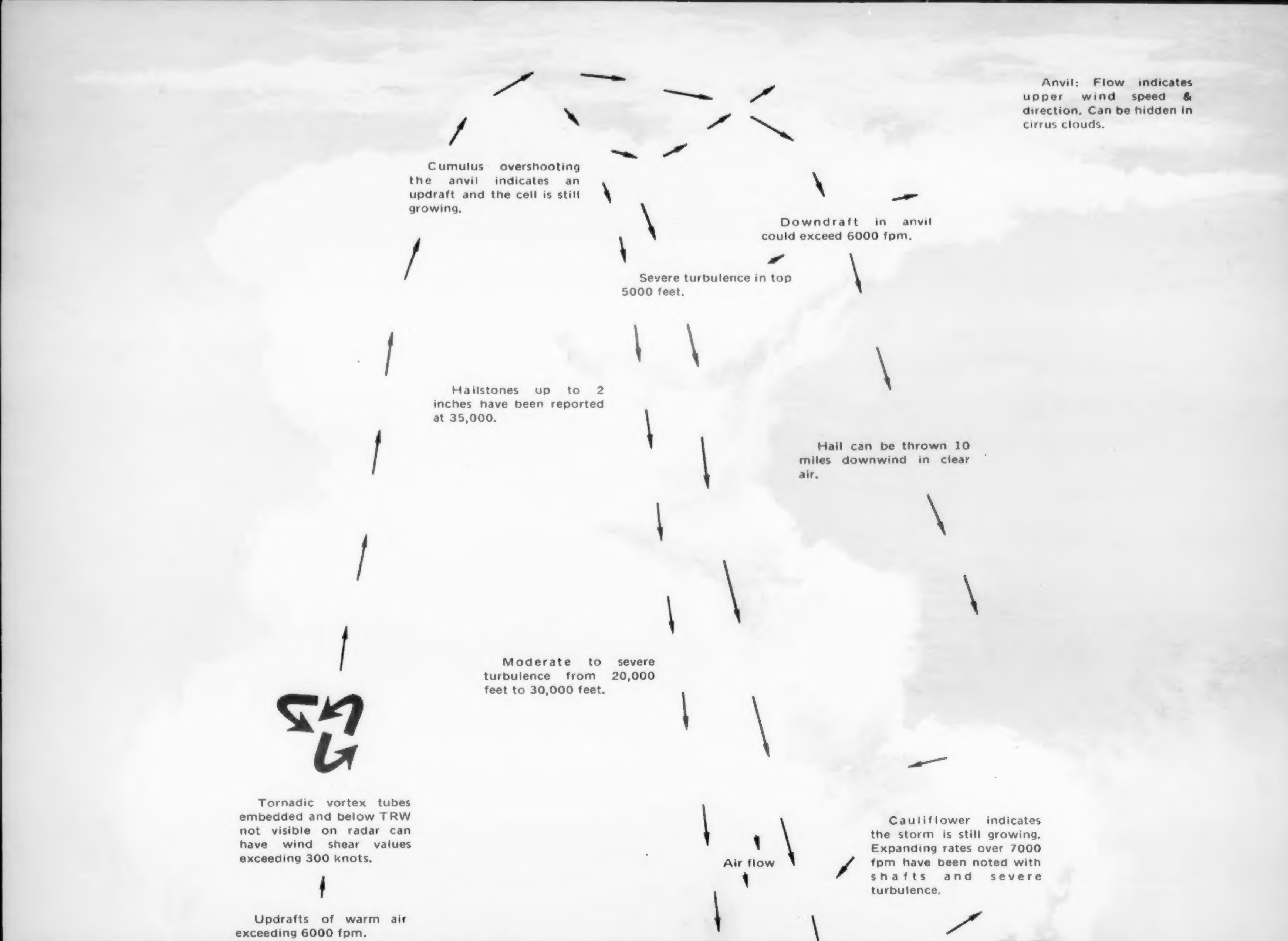
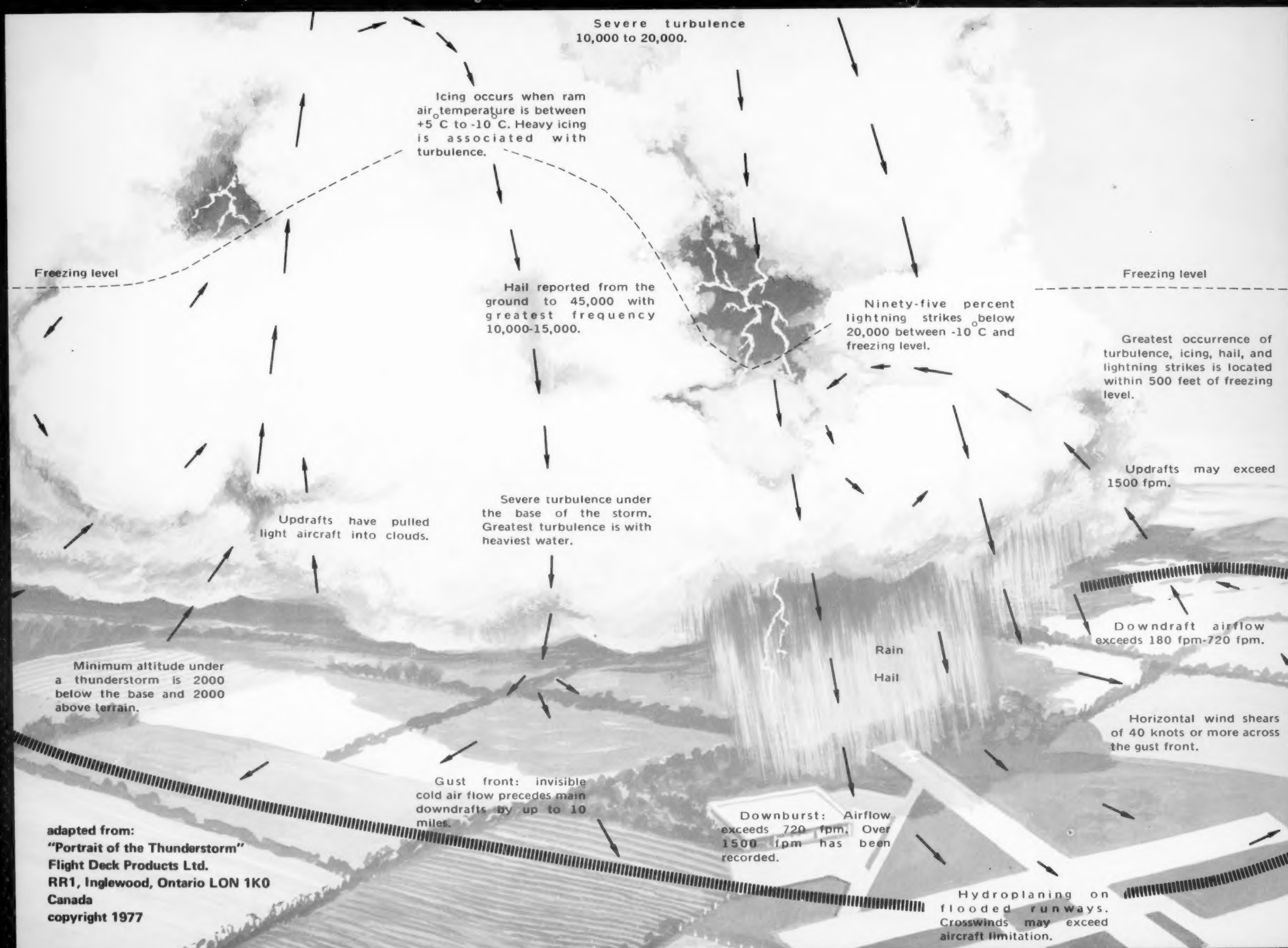


Anvil: Flow indicates upper wind speed & direction. Can be hidden in cirrus clouds.
Cumulus overshooting the anvil indicates an updraft and the cell is still growing.
Downdraft in anvil could exceed 6000 fpm.
Severe turbulence in top 5000 feet.
Hailstones up to 2 inches have been reported at 35,000.
Hail can be thrown 10 miles downwind in clear air.
Moderate to severe turbulence from 20,000 feet to 30,000 feet.
Tornadic vortex tubes embedded and below TRW not visible on radar can have wind shear values exceeding 300 knots.
Air flow
Cauliflower indicates the storm is still growing. Expanding rates over 7000 fpm have been noted with shafts and severe turbulence.
Updrafts of warm air exceeding 6000 fpm.


Severe turbulence 10,000 to 20,000.
Icing occurs when ram air temperature is between +5°C to -10°C. Heavy icing is associated with turbulence.
Freezing level
Hail reported from the ground to 45,000 with greatest frequency 10,000-15,000.
Ninety-five percent lightning strikes below 20,000 between -10°C and freezing level.
Freezing level
Greatest occurrence of turbulence, icing, hail, and lightning strikes is located within 500 feet of freezing level.
Updrafts may exceed 1500 fpm.
Updrafts have pulled light aircraft into clouds.
Severe turbulence under the base of the storm. Greatest turbulence is with heaviest water.
Rain
Hail
Downdraft airflow exceeds 180 fpm-720 fpm.
Minimum altitude under a thunderstorm is 2000 below the base and 2000 above terrain.
Horizontal wind shears of 40 knots or more across the gust front.
Gust front: invisible cold air flow precedes main downdrafts by up to 10 miles.
Downburst: Airflow exceeds 720 fpm. Over 1500 fpm has been recorded.
Hydroplaning on flooded runways. Crosswinds may exceed aircraft limitation.
adapted from:
"Portrait of the Thunderstorm"
Flight Deck Products Ltd.
RR1, Inglewood, Ontario LON 1K0
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Sometimes the only way to correct a hard-to-find discrepancy is to troubleshoot with lots of . . .

Patience

THE crew of a P-3 had been launched on a SAR mission. After about 4 hours into the mission, with the No. 1 engine secured for loiter and while cruising at 300 feet, the flight engineer moved forward and noticed smoke in the vicinity of the TACCO's overhead vents.

The flight engineer reported his find to the PPC and checked the main load center and found more smoke. The PPC alerted the crew, activated the fire bill, and secured the cabin exhaust fan. Smoke was concentrated in the hydraulic service center forward bilge area. The hydraulic pumps were secured one at a time, but there was no change in the smoke intensity.

Meanwhile, the PPC started No. 1 engine, declared an emergency, and headed for Homeplate. While homeward bound, the Bus A was secured. No change. Then the PPC went to boost out and again secured the hydraulic pumps. No change. A third report of the smoke source was made. The smoke was in the hydraulic service center, doppler well, and main load center. The EDCS (Engine Driven Compressor System) was dumped, and Bus B was secured. After this, the TACCO reported the smoke started to dissipate, and the flight engineer announced the No. 2 hydraulic pump was coolest.

The pilot turned on both pumps, lowered the flaps and gear, and made an uneventful landing. The aircraft was secured and the crew exited the aircraft over the flaps.

Maintenance sleuths swarmed over the aircraft. They thoroughly checked past bad actors, researched many possibilities, and conducted prolonged ground runups, with all systems on the line. It was all in vain. No cause for the smoke could be determined. 'Twas time for a conference, to review what had been done, and to decide the next move.

A decision was made by the AMO (Aviation Maintenance Officer) to run a test hop. He and his crew with additional QA personnel took off to duplicate the problem as closely as possible. Approximately 50 minutes later, smoke was noticed again accumulating in the bilge area, forward of the hydraulic center, and forward of tank No. 5. Numerous attempts were made to isolate the source but to no avail. Sticky little wicket. An emergency was declared, and the AMO returned and landed.

The AMO kept his crew and QA folks together, called in the first crew, and discussions ensued between all of them. Their initial focus was directed toward the smoke intensity, smell, and location. Finally they turned their attention to the air compressor area.

It was decided to make another ground turnup with all heated floor panels removed, electronics bay doors removed, and all systems on the line. JACKPOT! The air compressor was continuously cycled, closely monitored, and after 30 minutes smoke began to appear. The compressor was secured and the smoke abated. It was removed and replaced, and no further smoke discrepancies occurred during a 2.5-hour test flight or subsequent operational flights.

Resolution of the smoke problem was complicated by the elusive route of the smoke and the fact that all systems functioned normally. Troubleshooting this discrepancy took many hours by many knowledgeable people, but they persevered and the gripe wasn't written off "ground checks OK." ◄

Let's look at jet fuels

By Dan Orchowski *Reprinted courtesy of Product Support Digest, McDonnell Aircraft Corp.*

MOST U.S. military aircrews and technicians dealing with turbojet engines have been exposed to only the fuel designations JP-4 and JP-5; some foreign crews know these two as NATO F-40 and F-44; to some others, they are AVTAG and AVCAT. But whatever they may be "called," how familiar are you with their history, composition, and the health and fire hazards present when working with them? And are you aware of the latest fuel in the series — JP-8? And how about the commercial jet fuels? Reading this article should clear up some of the confusion and perhaps broaden your knowledge of the "fluids" consumed by a turbojet engine.

All fuels are health and fire hazards whose degree of seriousness depends upon the degree of care and respect given these fuels by the people working with and around them. All liquid fuels are *designed* to "burn," i.e., to atomize and combust; unless they burn, the engine doesn't go! But sometimes, instead of "burning" smoothly, these volatile liquids can explode violently if somebody fails to show them the proper care and respect. So, just as a rose by any other name would smell as sweet, jet fuels by any of their various designations pose the same basic problems in handling and using safely. To better understand the problems, let's first take a brief look at the background of liquid hydrocarbon fuel as developed for use in jet propulsion.

When Sir Frank Whittle, pioneer developer of the jet engine, first started his research back in the 1930's, he used

ordinary household kerosene as fuel. As the turbojet engine developed and was introduced as a modern means of aircraft propulsion, it became evident that a new set of fuel requirements was needed. The first MilSpec for jet fuel was written in 1940 (MIL-F-5616). The fuel developed in accordance with this specification became known as JP-1, the first fuel specifically designated for jet engine usage. (Incidently, the "JP" stands simply for Jet Propulsion.)

In the early 1940's, knowledge of jet engines was extremely limited. As a result, the JP-1 fuel spec was written strictly to satisfy the engine requirements. No consideration was given to cost and availability; and it was soon found that JP-1 could not be produced in sufficient quantities to meet military requirements. In an effort to increase availability, a less restrictive fuel, JP-2, was authorized in 1945. During its experimental use, JP-2 was found to be similarly limited for large scale production because of its viscosity restrictions. The availability problems posed by JP-1 and JP-2 thus resulted in the adoption of JP-3 in 1947.

JP-3, though readily available, also had its drawbacks. As faster climbing aircraft evolved, it was found that this fuel suffered high vapor loss during a rapid climb. As much as 25 percent could be lost, a shortcoming which reduced the range of the aircraft appreciably. The vapor pressure of JP-3 was reduced several pounds per square inch, producing a new fuel which received the designation JP-4.

Introduced in May 1951, JP-4 is today the standard fuel used by the USAF, by "land" based U.S. Navy aircraft, and is the primary fuel (though known by various designations as we learned earlier) used by most NATO nations flying aircraft powered by turbojet engines. JP-4 is an approximate blend of 65 percent straight-run gasoline and 35 percent kerosene.

As jet engine technology advanced, needs arose for special fuels for specific applications, distinctive situations, or unique aircraft. These were JP-5, JP-6, and JP-7, of which the most widely used today is JP-5. This is a fuel of low volatility and high flashpoint especially designed as a less fire-hazardous fuel for jet operations and for storage and handling aboard aircraft carriers. It is a narrow-cut kerosene (called "narrow cut" because of its high flashpoint). JP-6 and JP-7 can be classified as special fuels, whose only application are for unique aircraft flying a distinctive mission.

JP-8 has been around for several years and while it has not yet seen wide use in military aircraft, it appears to be the logical replacement for JP-4. Generally, it is like Commercial Grade Jet A-1 Kerosene, with anticorrosion, antioxidant, and anti-icing additives. It like JP-5 is a kerosene type fuel.

JP-8 is a low volatility fuel and as such its greatest advantage is that it enhances aircraft combat survivability. In a comparison test program between JP-4 and JP-8, it was found that on the average, JP-4 had 2.5 times as much damage potential as JP-8.

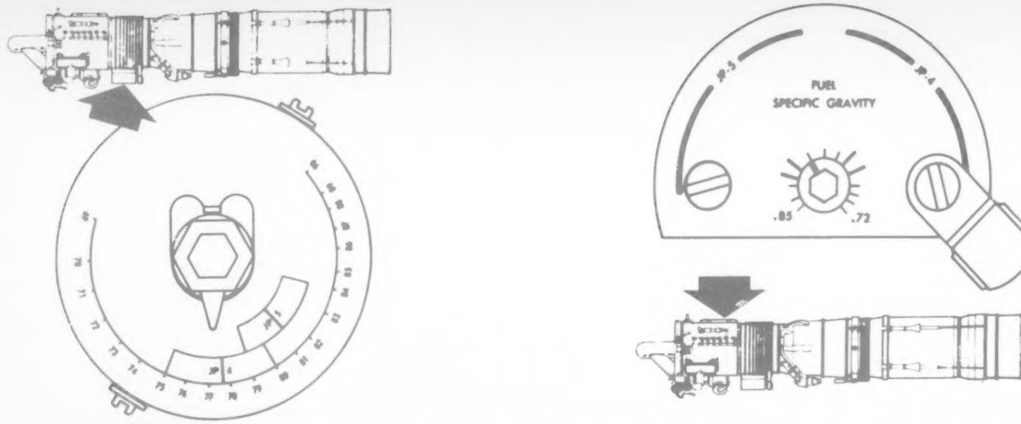
"KEROSENE is safer than gasoline, generally, but does not allow relaxation of safety standards."

Also, JP-8 is less susceptible to fire and explosion by gunfire when compared to JP-4. Other advantages are that it represents a major step toward realization of worldwide fuel standardization with accompanying logistic capability, overall cost savings, and fuel availability. Because it emits

FUEL SUMMARY

Fuel Grade	NATO Code No.	U.K. Interservice Designation	Fuel Type
AVGAS 115/145	F-22	AVGAS 115/145	Aviation Gasoline
JP-4 (a)	F-40	AVTAG/F.S.I.I.*	Wide Cut
JP-5 (a)	F-44	AVCAT/48	High-Flash Kerosene
JP-8 (a)	F-34	AVTUR/F.S.I.I.*	Kerosene
Commercial Fuels			
JET A-1 (c), (d)	F-35 (b)	AVTUR/50	Kerosene
JET A (c), (e)	–	–	Kerosene
JET B (c), (f)	F-45	AVTAG	Wide Cut

(a) Contains anti-icing, antioxidant corrosion inhibitors in same quantity.
(b) Same as F-34 except no anti-icing additive.
(c) Individual airlines specify additives and certain properties for commercial jet fuel.
(d) -50 °F – 45 °C freezing point, similar to JP-8 type fuel.
(e) -36 °F – 37 °C freezing point.
(f) Similar to JP-4 type fuel.
* F.S.I.I. – Fuel System Icing Inhibitor.



Some aircraft, such as the F-4, can have various adjustments made to the fuel system to permit use of alternate fuels under certain circumstances. J-79 engines on *Phantoms* are adjustable from standard JP-4 to alternate JP-5 with two devices here: Afterburner Fuel Control at left, Main Fuel Control at right.

less vapor, ground operations and maintenance in general should be safer with JP-8.

As with almost anything, there are advantages and disadvantages, and JP-8 is no exception. It has a higher freezing point than JP-4; its increased density will have an impact on aircraft mission requirements such as weight and takeoff distance; some engines using it could be more susceptible to flameout; the relight envelope would be reduced; and time for relight would be increased.

Recent directives indicate that JP-8 will be required as an alternate fuel on all new and current turbojet-powered military aircraft. Problems on present equipment and the impact of introducing JP-8 as an alternate to JP-4 are being actively investigated. It is assumed that when the problems associated with its use are identified and resolved, JP-8 will be phased in by degree. This would allow the refiners to adjust gradually to changes necessary for conversion to this type fuel.

One question that often arises is with fuel interchangeability – can one type fuel be used in place of another? The total answer to this question is rather complex and beyond the intent of this article. However, in general, it depends on three important considerations:

• The servicing instructions and/or checklist for the particular aircraft.

• Operating limitations when an alternate or emergency fuel is used.

• Depending upon the engine, a Fuel Control adjustment or engine retrim (consult applicable MIM).

Many people are unaware of and uninitiated to the dangers that jet fuels can present from a safety standpoint. For those in this group and those who may have forgotten, let's look at some facts concerning them.

• Because of its lower volatility and higher electrostatic generating tendencies, jet fuels are generally more hazardous than aviation gasoline (AVGAS 115/145 grade). As it flows over another surface, jet fuel develops an electrostatic charge. Given the proper set of circumstances, this electrostatic charging can constitute a real hazard.

• During refueling and defueling operations, the air/fuel mixtures are predominantly in the explosive range and only a spark is required to bring on an explosion.

• Vapors from jet fuels are more toxic than vapors from Aviation Gasoline, and extensive inhalation of these vapors can cause serious illness. Accidental swallowing of jet fuels will result in internal injury and possibly death.

• When allowed to come in prolonged contact with human skin, jet fuel sets up a solvent action removing natural fats and oils from the skin. This sets up the skin for infectious dermatitis.

These facts should be enough to alert you to the importance and necessity of the following precautions:

• If a fuel spill occurs, DO NOT drag tools, toolboxes, or metal objects of any kind through or near the spill. A spark may cause a conflagration. A spark (orange) from steel reaches a temperature of 1650 to 1750°F, and can provide erratic ignition to a fuel air mixture. A spark (white) from titanium exceeds 2000°F, providing a higher probability of igniting a fuel/air mixture.

Follow the Safety Precautions we've outlined and the Fuel Servicing Warning notes in your aircraft's manual. In that way, the only place turbojet fuel will burn is in the burner cans of the engines powering your aircraft.

JP-8 is similar to JP-5 except that the flashpoint of JP-8 is 100°F (minimum) versus 140°F for JP-5. Both fuels are kerosene types with approximately the same specific gravity. When changing from JP-5 to JP-8, no fuel control adjustment is required. JP-8 may be used as an alternate fuel in all Navy aircraft without limitations.

Aircraft coming aboard carriers from land bases where JP-8 was supplied can be topped off with JP-5. Removal of JP-8 is not required. If removal of JP-8 from an aircraft is found necessary, it shall not be defueled into the ship's JP-5 storage tanks. – Ed.

Bravo Zulu

LT Lowell D. Clifton, USN

DURING a familiarization/aerobatics flight in a T-34C, LT L. D. Clifton, the instructor, was rolling wings level at 6500 feet after a few seconds of inverted flight *when the propeller feathered!* LT Clifton cycled the condition lever several times in an unsuccessful attempt to restore prop RPM. He checked for other cockpit indications and noted a generator annunciator light and the associated master caution light illuminate.

He extinguished the master caution light and attempted, again unsuccessfully, to reset the generator. The engine was still operational and the condition lever was recycled once more. This time it was cycled to the feather position and back to full increase RPM, but without regaining a functional prop. The power control lever was increased until unusual vibrations occurred at a torque indication of less than 500 foot-pounds. The power control lever was then reduced to idle and the condition lever left at the full-increase RPM position.

The instructor maneuvered the aircraft for entry into emergency landing pattern from a high-key position over an outlying field and executed a full-stop landing.

A postlanding oil quantity inspection was made, and the oil quantity was found to be normal. The prop remained in the feather position during initial, corrective maintenance turnup. The problem subsequently was isolated to a malfunctioning prop overspeed governor. It was removed and replaced, and the next turnup was satisfactory.

Kudos to LT Clifton who had a thorough knowledge of his aircraft systems and NATOPS procedures, and who exhibited superb airmanship. Well done.

GOOD POWER MANAGEMENT

A must for helo pilots

By CWO4 J. S. Chastain, USMC
H&HS-90, MATSG-90

RECENT summaries of helicopter accidents have given cause for concern. Helicopter pilots have gotten into trouble because their operable machines were in evolutions where power required exceeded power available, and controlled landings could not be accomplished.

One was an H-46 which was attempting a confined area landing, lost an engine, and crashed near the LZ. Overshooting the LZ seemed to be part of the problem during his approach, before the engine failure.

Another was an H-57 with a student pilot at the controls who was attempting to stop a clearing turn to the right. Flying RPM was lost, and the aircraft crashed.

Yet another was an H-1 in which a climbing left turn out from an LZ was attempted. Too little power was available for this maneuver, and it crashed.

Finally, the one entitled "Another Bit the Dust," OCT '77 APPROACH, was an H-53 crash, troubled with a loss of RPM in a waveoff evolution.

What do these accidents have in common? There are indications in each case that the available power was improperly managed. The indication that poor power management existed leads one to question the sufficiency of training time given to this essential area – power management – which is the heart of professional helicopter flying.

Fortunately, the days are gone when almost every landing and takeoff had to be planned to remain within a very narrow envelope between power required and power available. Technology has given us more horsepower per pound of engine weight, and most modern helicopters are configured with two engines. Payloads have increased manyfold, and the routine flight requires much less than maximum torque.

Unfortunately, there are occasions – only frequently enough to come as a surprise to a pilot – wherein some customer will find a way to load an aircraft beyond the pilot's and his machine's capabilities. When this happens, and rotor RPM starts decaying, all is not necessarily lost. But does the pilot's personal data bank tell him how to best manage the poor situation? Does he have enough practice in judicious power management to routinely fly in an envelope that will rule out most of these rude surprises?

There are some exercises which may be beneficial to those fortunate ones who never experienced the loss of

rotor RPM to a degree which degrades either lift or heading control to a point of (seat biting) anxious concern. Comments will be slanted toward aircraft of single main rotor/antitorque tail rotor configurations. Also, except perhaps for the H-1, the larger sail area aft of the main rotor mast gives these aircraft a weathervane characteristic. This is less evident in modern aircraft that have a large area of their profile foreward of the mast. It may vary the procedures for crosswind power management, but the principles remain the same.

One torque management drill is the selection of a power setting at the 180-degree position from the desired LZ. The pilot then holds that power setting, varying altitude with airspeed, until either a waveoff is required, or a successful zero groundspeed, level attitude hover over the desired LZ requires the addition of power. Ground rules should be set for an altitude above which a zero groundspeed level attitude hover will not be acceptable. Also set a maximum allowable flare angle. Take care that prudence overrides zeal, as pilot-copilot competition can become keen. This drill, if developed into a habit, can make single-engine approaches much easier to handle. Low vertical speed is important during this exercise.

To demonstrate the power expended by poor tail rotor control management, align the aircraft so that a strong wind is about 30 degrees right of the nose. Ensure that the

aircraft is lightly loaded, and plenty of extra torque above no-wind, HOGE power is available. Take off on this preselected heading. While groundspeed is still slow, execute a left turn to the downwind leg, utilizing just slightly too much left rudder input for a balanced flight turn. Then make a similar takeoff from the same spot, but this time turn out to the right. This last maneuver will take slightly less torque.

This difference in torque translates to disastrous power mismanagement when a maximum load takeoff is immediately followed by a climbing left turn. Any turn downwind at low airspeed and altitude is poor headwork. The unbalanced left turn requires torque to the tail rotor which is additional to that required to counteract the main rotor torque at takeoff power. The tail rotor must take a big bite of air to simply maintain heading during the application of power required for takeoff. This means, in most aircraft of this type, that a bunch of horses are shoving against that tail pylon just to keep it at 6 o'clock to the flightpath during a takeoff.

While the aircraft is critically slow, the streamline effect created by airspeed is, naturally, going to be of little help. Visual and seat-of-the-pants inputs tend to tell a pilot to overcontrol left rudder during a climbing turn to the left during takeoff. This is especially true if he must use maximum power. The pilot wants most of his main rotor lift to be vertical – not a large vector of lift into the turn. He can't afford to trade off any of that lifting power, so he, too often, turns left to avoid an upwind obstacle by pushing left rudder. This assigns an additional herd of horses to the task of pushing on the tail pylon to effect this heading change, drawing them away from the main rotor duties.

The first visual display of the results of this procedural error is far less dramatic than a tilted rotor disc, yet far more deadly. RPM starts unwinding on the gage, then the earth slowly draws nearer. This picture is highly disturbing, and more so if it's witnessed for the first time! Salvage action may be contrary to preconceived logic. The pilot must stop his turn, even before clearing the obstacle which required the turn. He must flare to stop forward motion, and usually must *lower the collective* slightly, if the luxury of altitude loss allows. This would ensure an RPM recovery sufficient to cushion the impact. Many times these corrective actions will put enough power back to work where it belongs. Recovery is then simply a matter of allowing the undercarriage to partially rest on a treetop until sufficient fuel is burned down to permit a takeoff and flight to a more desirable LZ.

Compared to this procedure, panic is *not* a viable alternative. Once RPM droops, at maximum power setting, any attempt to maintain the aircraft at its altitude at the expense of RPM will soon result in loss of heading control. At this point, uncontrolled landing usually occurs, often at a high sink rate. Rapid application of collective pitch to cushion landing impact, of course, is normally desirable, even if applied at something less than the RPM required for powered flight.

Simulation of overloaded takeoffs is nearly impossible. Nobody wants to intentionally decay rotor RPM to a point where tail rotor control is lost, or even marginal. The pilots of smaller aircraft find themselves in this situation with enough frequency to learn to respect this condition.

Another rather harmless way to demonstrate the additional torque expended when mismanaging left rudder input is to make a no-wind hover turn to the left, stopping the turn 90 degrees to the original heading. Then execute a 90-degree to the right, stopping the turn on the original heading. Additional torque will be required to stop the right turn. Even though sudden application of right rudder can release some additional horsepower to the main rotor from the tail rotor system, the payback must come at the time one stops the right turn by applying left rudder.

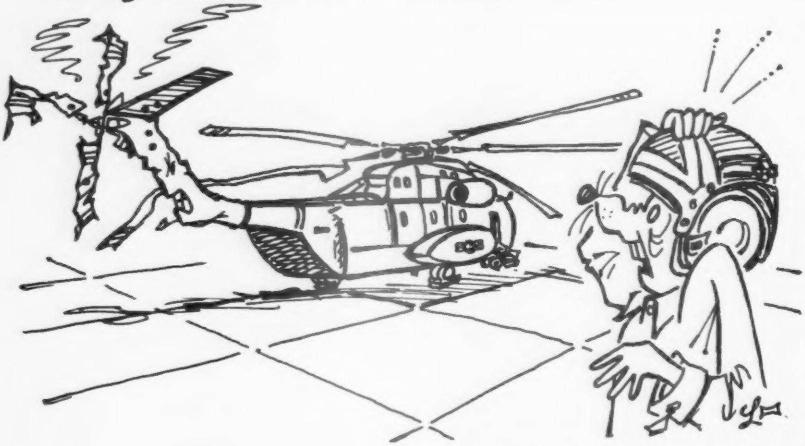
It has been said that more than one-fourth of the total engine horsepower can be drawn off for use by the tail rotor system, under the most adverse of conditions. But a pilot never wants to lose flying RPM due to the expenditure of unnecessary torque by poor rotary rudder management. Nor does one want to experience an inadvertent zero-airspeed hover (with *plenty* of groundspeed) caused by a dumb, slow, downwind turn, near max gross weight, during a brisk breeze.

We are discussing basic aerodynamic principles that all helo pilots should find quite familiar. Yet, even one classical max gross takeoff in a strong wind, with a low altitude, low groundspeed climbing left turn downwind into the face of disaster is an epidemic. It probably will not happen to the person who is experienced in an underpowered aircraft, and even if it does, it won't come as a surprise. After all, the second commandment of helicopter flying is, "Know thy wind, and keep thy bow into it at low altitudes." ◄

There is no expedient to which man will not go to avoid the real labor of thinking.

Thomas A. Edison

Anymouse



Gunner

I WAS scheduled to fly as aircraft commander of a CH-53 for aerial gunner training. This was the first time I had flown a gun mission since duty in Vietnam flying CH-46s. I took extra pains to thoroughly review NATOPS procedures for mounting the guns and the physical limitations for bringing the guns to bear on the target under various maneuvering conditions.

I was also familiar with a long series of incidents relating to ejection of links and shell casings from the guns into the CH-53 main and tail rotor systems. These incidents seem to be reported about every 6 months, and I reviewed the most recent one which had occurred 4 or 5 months ago. On preflight, I took extra time to check the installation of the guns and to thoroughly brief the crew chief and senior gunnery instructor on conduct of the mission. I was happy to be assigned both a senior crew chief and a senior gunnery instructor, and was perhaps lulled into a false sense of security by that assignment. Weather for the flight could not have been better as I proceeded on what I hoped would be a routine but enjoyable flight.

After clearing the target area, we commenced firing runs. When the first 1000 rounds had been fired, the crew chief requested permission to dump the links and shell casings which had accumulated over the ramp. We were over water in mid-range, so without fully considering this request, I granted him permission to dump, relying on his judgment and my own past experience in combat in a different type aircraft.

We continued the mission in what I thought at the time to be a routine manner, firing out 3000 more rounds and dumping three more times. The aircraft handled beautifully, and I returned to base having thoroughly enjoyed the mission. During postflight inspection of the aircraft, I discovered that the dumping I had allowed had caused damage to all four tail rotor blades and one main rotor blade which required replacement, as well as dents and scratches to the tail pylon area which required fiberglass repair and touchup paint work.

To say the least, I was heartsick both as to the danger I had placed my crew in, as well as the damage caused to the aircraft. This incident did serve as a valuable reinforcement to me to think beyond the sometimes austere verbiage in message incident reports as well as the assumptions sometimes reflected in NATOPS (i.e., that someone would not be foolish enough to dump trash from a helicopter). It also pointed out forcefully to me that no matter how senior and experienced you think your crew may be nor how much experience you may have in a different type aircraft under different operating conditions, as aircraft commander your ultimate responsibility is safe conduct. Any mission in or out of combat demands that you think through every request, no matter how trivial it may seem, prior to issuing your decision.

Sickmouse

Unexpectedly Long Takeoff Roll

AN A-7E pilot was scheduled for a 2.7-hour service hop on a nice spring day. He was scheduled for a standard 10,200-pound fuel load and had planned his fuel logs for that load.

The purpose of Anymouse (anonymous) Reports is to help prevent or overcome dangerous situations. They are submitted by Naval and Marine Corps aviation personnel who have had hazardous or unsafe aviation experiences. These reports need not be signed. Self-mailing forms for writing Anymouse Reports are available in readyrooms and line shacks. All reports are considered for appropriate action.

REPORT AN INCIDENT
PREVENT AN ACCIDENT

Everybody knows that an A-7E can take off on a hot day in about 4500 feet of roll – no real problem on an 8000-foot runway. However, as this pilot checked in with maintenance control, he was informed that he would have two droptanks and a total fuel load now of 13.4. Remarking how nice it was to have the extra fuel for this marathon endurance hop, the pilot happily checked out.

Upon preflight, he discovered that both drops were actually full, and thus he now had total fuel load of 14.2 thousand (change 3). Aircraft turnup went normally, and the pilot set his

TOP (turbine outlet pressure) gage for a runway temperature of 94 degrees. "Gee, that's a little low, but that's what it says," the pilot thought to himself.

He promptly taxied to the 8000-foot runway that, this particular day, had no headwind. He rolled onto the runway and lined up probably 350 feet short of the mirror, meaning 7600 feet of runway was left. Engine runup went OK, and off he went. At the 6000-foot board, he saw 85 KIAS. ("Little low, but not too bad considering the fuel load.") At the 4000-foot board, the pilot had approximately 125 KIAS. ("Man, this thing sure is accelerating slowly – well, I'm above refusal speed now. Wonder if I let the throttle creep back?") No, it was still full forward.

At the 2000-foot board, the pilot was looking at 145 knots. Knowing that takeoff speed was 157 KIAS, he decided to make a minimum takeoff run and rotate 12 knots prior to lift-off. Lift-off was accomplished just before the 1000-foot board, and an 18-unit angle-of-attack climbout initiated – with wide open eyeballs!

A little preplanning could have avoided this, as the computed takeoff roll turned out to be 6400 feet. Another interesting statistic is that it takes 11,500 feet just to climb 100 feet. If there had been bigger trees or power cables near the end of the runway, things could have been more interesting. The point is – *watch complacency!* It can really sneak up on you from behind. That old adage about the uselessness of the runway behind you . . . so true!

Wideyedmouse

Dinged!

AFTER preflighting the SH-2 for the scheduled morning launch, the pilots were standing on the flight deck talking to the CO of the ship. They were discussing whether to scrub the launch or continue on, since the ship had decided to go DIW (dead in the water) after flight quarters and paint the sides of the ship.

It was the fifth of a 6-month deployment, and the second long deployment that the LAMPS det had made with the ship. While the CO and pilots talked with their backs to the helo, a boatswain's mate appeared on the scene, opened a hatch that was located on the flight deck, and started pulling a wooden scaffold up that was to be used for the painting. While this industrious lad was looking down and pulling up, the scaffold was going up, and it continued up until it met one of the SH-2's rotor blades. The scaffold punctured the skin and left a 3-inch hole in the blade. Undaunted, the boatswain's mate decided damage was minimal and continued on with his task. Luckily, the det's crew chief noticed the lad gazing at the blade and decided to investigate. Upon discovering the blade's mortal wound, the chief ended the deck division's activities and informed the pilots that the launch was now "officially" canceled (difficult to fly with a hole in your blade!).

Had the crew chief not investigated the scene when his curiosity was aroused by the lad's gazing, the hole may have gone undetected. If the launch had proceeded as scheduled, it may have ended in destroying an aircraft and the loss of its crew.

Even though the helo was a familiar visitor onboard, and safety had been stressed to all hands, a ground incident still occurred because personnel unfamiliar with the flight deck and the helo's frailties were allowed on the flight deck. The det had become lax in allowing people on the flight deck while the bird was spotted. Prevention? Remind all hands on the FF/FFG of the susceptibility of the aircraft that serve them. Keep people off the flight deck who have no business there.

Violatedmouse

cargo load shifts

ANYTIME a pilot is requested to "take this back," meaning cargo of some kind, the best thing he can do is refuse. There are many things that can happen when carrying cargo, and most of them are bad.

For openers, is the cargo in the proper container? Can the container be secured to hold its position on takeoff and landing? Will the container interfere with any control cables? If the container breaks loose, will weight and balance of the aircraft be affected? If the container pops open, will any of the contents endanger any souls onboard, lodge in control cables, or make like a missile?

For example, the pilot of an aircraft with lots of room took some items for a friend from A to B. During the flight, the aircraft ran into a bit of turbulence. The containers popped open and little ole traveling iron ricocheted off one crewman's head, knocking him out, and gashed the leg of another crewman – it hit both of them on the same airborne circuit. The rest of the contents spewed all over the deck, picking up a spot of oil and grease. The shipper became highly irate at the pilot when he learned what happened. You just can't please some folks no matter how hard you try.

Then there's the real, sad story of the pros who let a load get away from them. These guys were in the business of hauling cargo. They knew the procedures, knew what security had to be taken, and despite normal precautions, they are dead.

They were victims of a load shift and never had a chance. The weight of their cargo was well within limits, and positioning of the load was right on the CG. They checked the securing devices, straps, and cables, and believed everything to be in order.

When ready, they took off. Somehow the cargo broke loose, slid aft (way out of CG limits), and the aircraft gradually increased its noseup attitude. The aircraft climbed to 300-400 feet, 60-70 degrees noseup, stalled out, rolled to the left into a dive, and crashed almost in a flat attitude. No one survived. Both engines were at full power, no controls had failed, but the CG had shifted so far aft that the aircraft couldn't fly.

Finally, there's the one about the CH-53 helicopter. Everyone knows a helo is a nice, wide, plenty-of-space slow mover. Well, would you believe that this whuppity whupper, with its wonderful turbines a-l-m-o-s-t fell out of

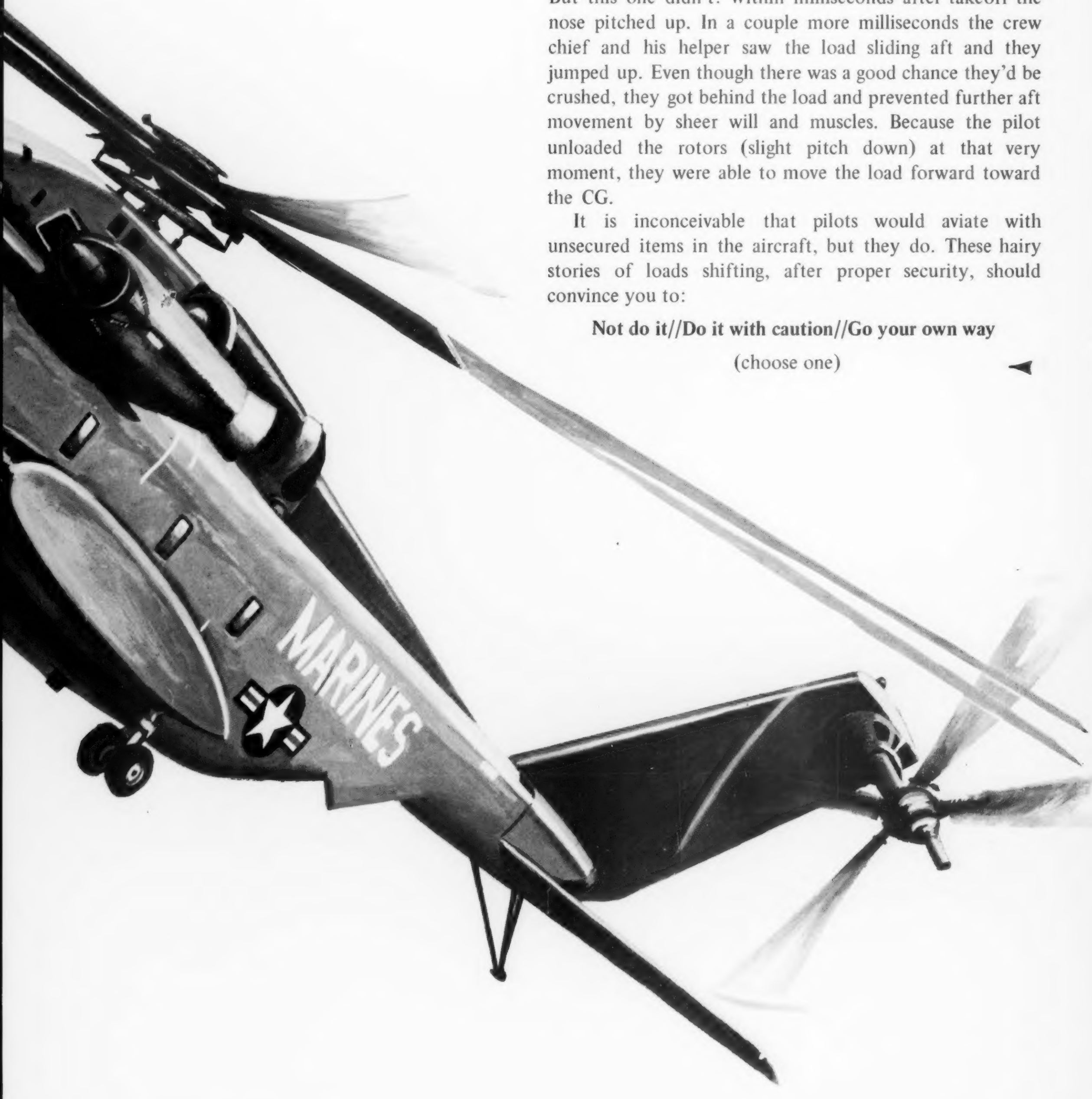
the sky? Seems that the crew had been tasked to transport, internally, a shiny, new, 1½-ton generator. The crew chief and helper were in the cabin strapped in for takeoff.

Nearly every helicopter ever built parks flat, takes off flat, climbs flat, glides flat, autorotates flat, and lands flat. But this one didn't! Within milliseconds after takeoff the nose pitched up. In a couple more milliseconds the crew chief and his helper saw the load sliding aft and they jumped up. Even though there was a good chance they'd be crushed, they got behind the load and prevented further aft movement by sheer will and muscles. Because the pilot unloaded the rotors (slight pitch down) at that very moment, they were able to move the load forward toward the CG.

It is inconceivable that pilots would aviate with unsecured items in the aircraft, but they do. These hairy stories of loads shifting, after proper security, should convince you to:

Not do it//Do it with caution//Go your own way

(choose one)



A memo from the Safety Officer to all VAW-125 pilots on . . .

DECK SPOTTING

By LCDR Tom Davis
VAW-125

MUCH is said about deck spotting. LSOs are always briefing, "Don't spot the deck. Stay on the ball to touchdown or you aren't flying the ball all the way down." Well, you're no more tired of hearing it than the LSOs are of saying it. But the truth is, a high percentage of carrier accidents (ramp strikes, hook slaps, hard landings, and offcenter hits) can be prevented by looking at what *should* be looked at when approaching the ramp – not only looking, but being critical of the information received.

But what does "being critical of what you see" mean? How would it be if the controlling LSO debated with himself as to whether a pilot is low or not; is he lined up or not? How would it be if he said, "I'll wait until I'm *sure* the aircraft is low or not lined up before I say anything"? That is not being critical of what you see. If this were the

situation, by the time the LSO made up his mind, the pilot could be in the spud locker or the catwalk. The old standard LSO remark, "We don't make mistakes," is not always true, but the job does force them to react early. Simply put, being critical of the information received while flying a carrier approach means reacting early to the information.

The E-2 has a lot of wing, and its approach speed is slow enough that the motion of the air caused by the ship's movement can affect the flightpath of the aircraft. Everyone has experienced the settle in-close caused by the burble and then the deck wash. Everyone has also felt the lifting of ground effect as the aircraft passed over the ramp. In order to compensate for these effects, it is more necessary, in my opinion, to fly the ball all the way to touchdown in the E-2 than in any other operational aircraft.

Remember the night when everything was going great – good needles, good start, never touched the power all the way down, AOA never moved, lineup was great, thought the OK was in the bag? Then, when in-close the ball started down, the power went up, the ball went up – and when you were comfortable you turned downwind. Remember the next pass when about the same thing happened except that when the ball was three-fourths of the way to the top and climbing, the power came off, the nose "one potatoed," and it was time to go below for chow? (Good food, too, since the grade was OK [SDAR] [BIW 4].) But it wasn't a very professional pass. In more extreme cases, it can also be hazardous to equipment and personnel.

So think back to the last time that happened. Think back to where the ball was when the aircraft trapped. Chances are the last position of the ball that you remember was where it was when the play started. By any name, that is spotting the deck. Spotting the deck is usually not a conscious act. (And who wants to perform unconscious acts at the back of the ship?) It is usually a combination of being behind the aircraft and wanting to salvage the approach for any number of reasons. Therefore, the solution is not to say simply, "Don't spot the deck," but rather to provide an understanding of how the situation developed that made the pilot go for it.

Spotting the deck starts well before the ramp. If the start is not right on, the workload increases significantly. When the pilot gets behind the aircraft for any reason, corrections become larger out of necessity, and the tendency is to get further behind. When the pass is going exactly as planned and it seems easy, complacency can immediately put the pilot behind. Then there is no indication of deck spotting to him until a large correction becomes necessary.

The way to make deck spotting unnecessary is to be critical of the information available throughout the pass. Being critical means finding fault. A critical situation is a crisis, and a crisis is a critical situation. If the aircraft is flown behind the ship as if every movement is crucial (it is), and sensory inputs are looked at critically in real time and not speculatively, small corrections can be made while the pilot is still ahead of what is happening around him. He can fly the aircraft (not vice versa), and the situation he finds himself in over the wires will not warrant a play. Have a plan, be critical, put the aircraft exactly where it should be, and go below with more than an OK pass.

A TIMELY ABORT

PASSING 100 KIAS during takeoff roll in his A-6E, 1st Lt Whomsley applied slight aft stick pressure to rotate for takeoff. When this had no noticeable effect, the pilot increased back stick pressure, which resulted in a progressive nosedown attitude as the aircraft accelerated. Reacting decisively and rapidly, the pilot aborted the takeoff. The B/N, Maj B. R. Rusthoven, dropped the hook short of the longfield arresting gear. The *Intruder* successfully engaged the E-28, sustaining no damage.

Maintenance inspection revealed that the lower rod end of the load-relief bungee had disconnected from the walking-beam assembly. This was the fourth known occurrence of this type. *All three previous instances resulted in fatal crashes.*

Maj Rusthoven and 1st Lt Whomsley of the VMA(AW)-121 Green Knights unquestionably prevented the loss of their aircraft and may have saved their own lives by their consummate skill and teamwork.

Emergencies during takeoffs don't allow much time for analysis and decision. To successfully execute a high-speed abort, an aircrew has to think out many probable takeoff emergencies prior to their occurrence and preplan their action. By doing this they will be better able to react to the actual emergency when it happens. Preplanning, teamwork, and decisiveness are key factors in successful aborts.

AN UNBROKEN CHAIN

By CAPT J. R. Saunders, USMC

IT'S an old – and valid – aviation axiom that accidents are rarely caused by only one event. Typically, factors lead up to an accident, like links in a chain. Remove one link and the accident doesn't occur. Unfortunately, for a student pilot on a night formation hop in a TA-4, all the links remained intact, and the accident occurred. It almost cost him his life.

The student was given a standard 45-minute brief for a night formation solo hop. Weather was forecast above CNATRA minimums of 1500/3 for the duration of the flight, although there was about a 1000-foot layer between 2500 and 3500 feet. Start, taxi, and takeoff were routine, with the takeoff occurring 3 minutes prior to official sunset. This meant that the initial portion of the flight – break up and rendezvous practice – was conducted in twilight "pinky" conditions.

Following the high work, flight lead requested a random radar recovery in section. The flight was cleared to descend from 12,000 to 3000 feet and assigned a discrete frequency for the approach. Lead acknowledged the frequency switch and directed his student to change to the manual frequency. He received no acknowledgement from the student.

Lead was unable to establish contact with his wingie on the new frequency. Since he was passing 9000 feet and closing rapidly on the field, lead requested a 360-degree turn while he tried to get his wingie up the frequency. This request was approved, and the flight entered a descending port turn.

During the turn, it was established that the wingman was receiving lead's transmissions but not those of Approach Control. His transmitter was intermittent and garbled. Lead requested the student to secure his anticollision beacon if he copied the various transmissions.

Lead then instructed the student to dump to landing weight and to indicate that he copied by securing his

anticollision light. The student verbally reported that he was at 3500 pounds fuel and would not need to dump. He went ahead and turned his anticollision light off, then on again, anyway.

The flight leveled at 4000 feet and had been in a port orbit for at least 6 minutes. Approach Control issued clearance to continue the approach and to extend the gear and flaps above the undercast, as requested by lead. The section extended gear and flaps on radio signal while level at 4000 feet. When dirty, the section was cleared to descend to 3000 feet and maintain 160 KIAS for traffic spacing. Further clearance to 1800 feet and a 20-degree heading change were received as the flight entered the ragged cloud layers.

The flight encountered the multilayered IFR conditions until 2500 feet at which time they had visual contact with the ground through a lower scattered to broken cloud deck. At some point in the descent, the wingman experienced severe spatial disorientation and felt that the lead was in a prolonged steep right turn. Unfortunately, he did not transmit his problems to lead or attempt to cross-reference his instruments.

Another turn of 50 degrees was requested by Approach Control for a turn to final. Prior to starting this turn, the wingman's aircraft was observed to move rapidly from the right wing of lead, disappear behind and reappear on the left side of the flight in a left-wing-down, nose-low attitude. Instructions by the lead to pull up had no effect, and the student pilot ejected shortly thereafter.

The pilot got out by the skin of his teeth. His ejection seat landed on top of his parachute about 20 feet from where he landed. Analysis of the ejection sequence showed that if he was in the advertised envelope of the seat at all, he was right on the edge.

Why was this aircraft lost – and almost the pilot as well? Pilot error was the obvious answer, since the pilot did not immediately reference his instruments upon becoming disoriented and separating from the formation. But that wasn't the whole story. The board examined a long chain of seemingly unrelated events that led up to this mishap – and then they became relative.

During its investigation, the board came up with many deviations from normal routine and procedures. It may be a point of contention, but most aviators agree that if there were no deviations from normal routine and procedures, there'd be a lot fewer accidents. What was the effect of the deviations in this accident?

Preparation. The student pilot received a thorough night flying lecture the day prior to Christmas leave. Between the leave period and the time he actually started night formation, 5 weeks elapsed. This pilot may have forgotten some of the finer points of the night flying lecture during this time lapse.

Experience. Each of his three night formation flights launched within 3 minutes of sunset. They weren't all scheduled that way – it just happened. But this put the majority of his night wing experience in relatively light conditions. At the most, he had about 40 minutes of formation experience in actual darkness. As a result, his proficiency was less than it could have been.

Instruments. The ill-fated aircraft had two outstanding gripes on the front cockpit attitude gyro lights as being "too dim to see." The pilot later stated that he had no difficulty seeing the instrument. But it is possible he could see it well while looking directly at it, but that it was a little too dim for a quick crosscheck while flying IFR wing at night.

Communications. The pilot had difficulties, or at least his leader and Approach Control were convinced he did. Perhaps it all started when lead changed frequencies

without an acknowledgement from two. The pilot stated that he could hear lead, although garbled, but he could not read Approach until they were in-close. This is the type of reception one would get if the aux receiver were in the *Command* mode, driving the main receiver to the ADF antenna. The pilot used this mode to receive airport information after starting, but was pretty sure he had it back in the proper mode for takeoff. As it got darker, could he have moved the wrong wafer switch while adjusting his cockpit lights? No one knows. The wreckage of the control panel had no story to tell.

Techniques. While trying to reestablish communications, the flight maintained a descending orbit for about 6 minutes. Meanwhile, the pilot was engaged in numerous cockpit movements (radios, fuel, lights, etc.) which required him to look away from his leader. Could this flightpath and his repeated head movements tend to set him up for the disorientation he later experienced?

Chow. During the 21 hours preceding the accident, the student pilot flew two formation hops, including this one. He consumed one BLT, some fries, and a coke. That doesn't sound like a lot of fuel to run on, but what aviator hasn't done the same thing and made it back to the readyroom? As a small link in the chain, how possible is it that his body was running a little lean when he needed everything he had?

Night/IFR. Finally, it was night, and there were clouds. Try as we might to avoid these demons, they are facts of life we must accept from time to time. In this case, they appear to have been the "straws that broke the camel's back." With a NORDO wingman and a VFR field – it was 1000/7 – no one can fault lead's decision to bring him home. But when they got in the clag, all the above factors and perhaps a few we missed ganged up to put this jock in a crack he couldn't get out of. He was so disoriented and so tight on lead that he "dared not" (his own words) even crosscheck his instruments. When a gust of wind or turbulence or whatever put him out of position and in danger of collision, he decided to separate from the formation. In doing so, he watched lead a little too long and by the time he got on the gages, he had only time for the best decision of his life – BOOM!

So there they are: A series of deviations, none of which alone caused this accident. Some of you may even think them unworthy of consideration. But from every accident, regardless of the circumstances or even type aircraft, each of us should learn something. So what can we learn from this one? Let's look again at the deviations.

Preparation. How well prepared are you for every hop? Do you know your procedures cold? If you don't remember everything about the hop you're going to fly, get back into the books and know your stuff!

Experience. The folks who write flight schedules do their best to ensure that every pilot attains and maintains the highest possible level of proficiency possible in every phase of flight. But the realities of day-to-day operations make that job almost impossible. If you as a student, replacement pilot, or Fleet pilot have been cut short on nighttime, instrument work, or the bomb pattern, *you* are the one that knows it best and must see that you get scheduled for what you need. If you need nighttime, avoid the temptation to launch in "pinky" conditions. Anyone content to be just a naval aviator is in the wrong business. You've got to want to be the best – and you can't be if you get cut short on experience.

Instruments. Can you see your instruments clearly and interpret exactly what they're telling you in one quick glance? More importantly, do you take that glance as often as necessary? When you're on the wing, or riding second seat, do you know where you are and what you're doing all the time? There's only one thing worse than a smoking hole in the ground: two smoking holes with 5 feet of wingtip separation.

Communications. When you are leading a flight, do you demand acknowledgement of all signals? When you're on the wing, do you acknowledge them? Do you know your lost comm procedures? Are they covered thoroughly in every brief you give – or get? How well do you know the switchology of your comm gear? Do you have to search a long time inside the cockpit to find the right knob? If you do, maybe it's time for an OFT or cockpit fam training.

Techniques. When you lead your next hop, will you orbit for 6 minutes before punching through a cloud deck? It may not be written in any book, but a lot of the "old heads" have a rule worth remembering: Don't fly in circles – especially with a wingman. If you must, realize that it can mess up your mind, and be prepared for it!

Chow. Everybody loves a fat man – unless he's wearing a uniform. So you're trimming a few pounds – fine. You say you're a busy man and can't seem to keep any kind of eating routine – OK. But always be aware that your body requires enough fuel to function properly. Don't wait for a hunger pain in your gut – that's like a low fuel light. Start using your fuel gage – your head.

Night/IFR. Night formation without a radio in the goo – that's a pretty tough job in itself. Throw in a roaring case of disorientation and you've got a handful. Once you're there, you've got to beat it before it beats you. If you don't use those instruments and believe what they say, you're just throwing in the towel and hanging your life on a thin thread of chance.

There's an old saying, "Not everyone can learn from other people's mistakes – someone has to be those other people." Let's make sure he's not one of us. ◄

WHO'S NUMBER ONE?

Tower, this is Approach. I have AIREVAC at 20 requesting priority straight in.
OK, Approach, tell him Runway 28. Give him to me on the 8-mile arc.

AN AIREVAC C-9 was cleared by Approach for a visual approach to Runway 28 and told to report to the tower on the 8-mile arc. AIREVAC checked in with the tower and was cleared to turn final at 8 DME. The weather was good and played no part in this story.

AIREVAC turned final and saw three aircraft in the VFR pattern: one turning base, one on the roll, and the third one on downwind. AIREVAC asked who was No. 1 to land and received confirmation that he was No. 1.

About 3 miles out, AIREVAC didn't like the conflict he saw, and asked again what the priority was. He was advised that the aircraft turning base was No. 1. AIREVAC continued to 1 mile and then executed a missed approach to avoid a midair. The aircraft in front of AIREVAC had been advised to turn left and break out, but didn't acknowledge the transmission. AIREVAC reentered downwind and was cleared to land.

An investigation of the incident included interviews and a review of tapes. Here's the sequence.

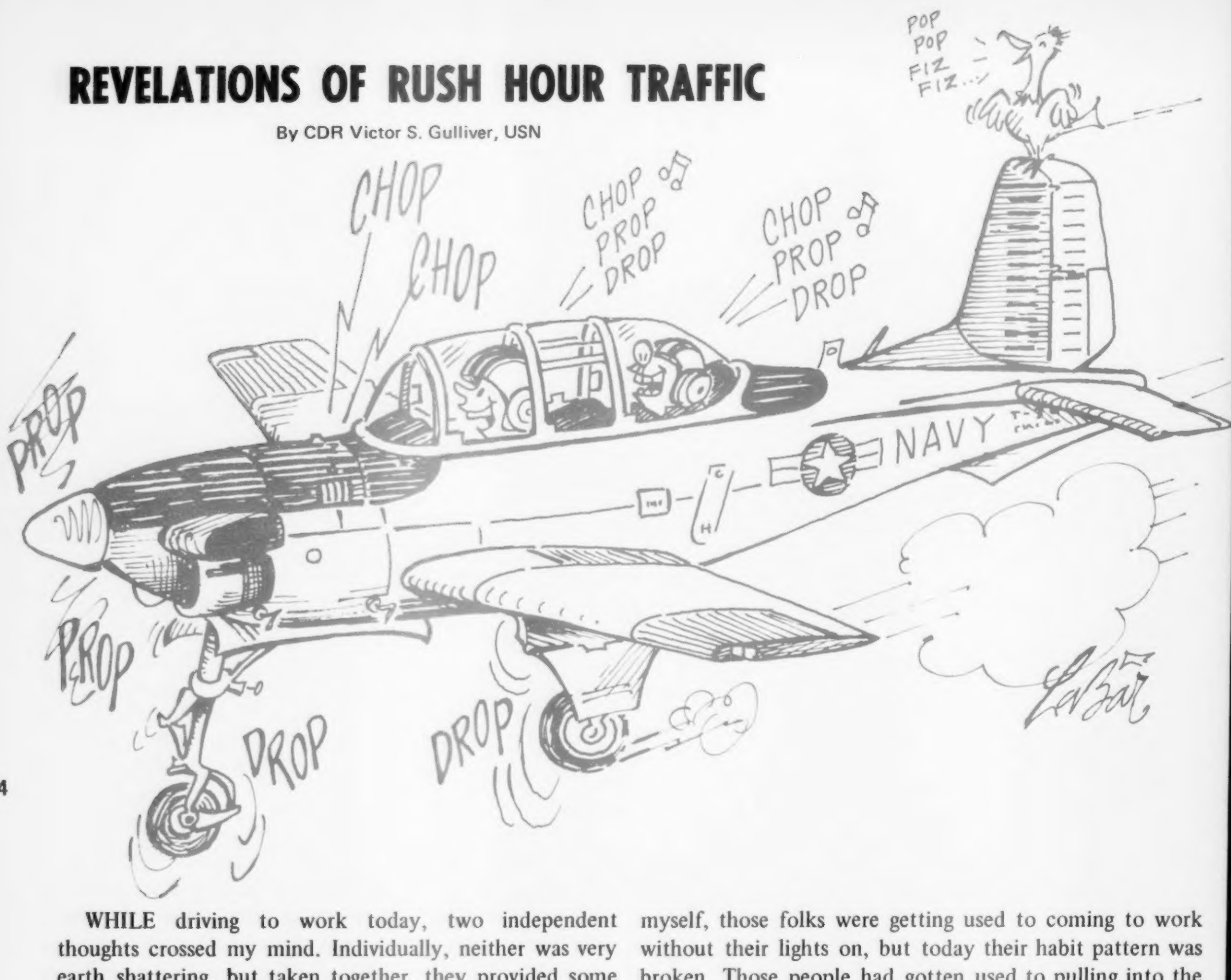
Time	Who	What
1806	AIREVAC	22 DME, 040 radial. Report 5-mile boundary for 28.
1808	VFR plane	8 east for landing. Cleared into the pattern.
1810	AIREVAC	Right base for 28 at 9 miles.
1810	Tower	AIREVAC report at 4 miles for base entry to pattern.
1811	AIREVAC	What traffic do you have?
1811	Tower	Three in the pattern. One downwind, one on base, one overhead.
1813	AIREVAC	On final, 7 DME, request traffic priority.
1813	VFR plane	Turning short final, AIREVAC in sight. Request touch-and-go behind aircraft touching down.
1814	Tower	VFR traffic continue.
1815	AIREVAC	We're 4 DME. What's that guy turning in front of me doing? Break him out.
1815	Tower	VFR traffic turn left immediately, follow the AIREVAC.
1816	AIREVAC	Waving off. It's too close.
1816	Tower	VFR traffic break right on the go.
1817	Tower	All VFR traffic leave the pattern.
1818	Tower	AIREVAC cleared to land.

The tower was receiving three frequencies through one speaker. All during the time of the incident there were several simultaneous UHF transmissions to and from the VFR traffic, VHF with the AIREVAC, and UHF traffic with Paddles. In all probability, the AIREVAC call at 1813 didn't register with the controller. The controller's attention was drawn to the VFR traffic requesting a touch-and-go, and at the time the controller did not have the AIREVAC in sight.

It's recognized that a controller's lot is a tough one in heavy traffic, and perhaps the controller in this story could have used better judgment in handling the priority traffic. But the ultimate responsibility for traffic separation remains with the pilot. Aviators should not be reluctant to initiate positive action of the type taken by the AIREVAC crew to end a dangerous situation.

REVELATIONS OF RUSH HOUR TRAFFIC

By CDR Victor S. Gulliver, USN



WHILE driving to work today, two independent thoughts crossed my mind. Individually, neither was very earth shattering, but taken together, they provided some interesting food for thought.

I was thinking about a recent aviation accident in which a trained, multiengine flightcrew experienced a wheels-up landing. The desk jockeys in the office had been discussing the accident. We had been commenting on how a pilot, copilot, and flight engineer (and who knows how many others in that big cockpit) could have a wheels-up landing. We have a superb NATOPS procedure for every eventuality, including landings, and we have a thorough checklist for nearly every occurrence, including landings.

Then my mind wandered off to other things. (It often does in the heavy Washington area traffic.) It was snowing this morning on the way to work, and it is springtime. Lately we have been able to drive to work without our headlights on, but this morning, because of the snow, we all had our headlights on.

As I pulled into the parking lot (a zillion yards from my entrance to the Pentagon) I noticed that three cars in the lot, unattended, still had their headlights on. Aha, I said to myself, those folks were getting used to coming to work without their lights on, but today their habit pattern was broken. Those people had gotten used to pulling into the parking lot, jumping out of their cars, and rushing to their first cup of coffee. They had simply forgotten that they had turned on their headlights earlier in the morning rush hour.

That got me to thinking about a friend in the office who, on two occasions, had left his headlights on in the Pentagon parking lot. It can ruin your whole day to come out to your car after a hard day, only to find a dead battery. My friend's solution to this forgetfulness was to print a little sign which he taped to the dashboard. It said, simply, "LIGHTS". My friend, who is also a desk-bound intrepid aviator, was certain that this new minichecklist would forever cure his problem.

Experience has shown otherwise. Since he put that sign on his dashboard, he has left his lights on three more times, and he even left his radio on once.

Rather than to make a bigger sign for his dashboard that said "LIGHTS and RADIO", we decided to talk over this problem. It seems that, rather than using his checklist

religiously, he was driving to work each day with the added confidence that his checklist would protect him from dead batteries. As long as he had that checklist on his dashboard, he didn't need to think anymore. The problem was that when he wasn't thinking, he wasn't remembering to use his checklist and he wasn't remembering to think either. He was worse off than before the checklist. The checklist was there. It gave him supreme confidence in his ability to navigate the precarious route from home to the Pentagon uneventfully (as we say in aviation parlance), but he was so confident that he became careless.

When I was going through primary training in the T-34, my instructor taught me one of several things that I have never forgotten. When entering the break for landing, I used to have to say "CHOP, PROP, DROP" over the intercom as I was chopping the throttle, advancing the prop, and dropping the landing gear. Once this evolution was completed, I was then allowed to run through the entire landing checklist.

I relied heavily on the landing checklist for all of the extraneous things that had to be done in preparation for landing. The chop, prop, and drop were really checked twice, once by memory out of sheer fear of the instructor's wrath, and a second time as I went through the checklist. Through the years, in several different types of aircraft, I have continued mentally to say chop, prop, drop even though they don't have quite the same significance anymore. While NATOPS procedures have changed the way we CHOP and the P-3 powerplant reduces concern for the PROP, there will always be a need to DROP.

The point of all this is that we may not be teaching our pilots to think enough. The last time I went through the VP RAG, I was scolded for having memorized the landing

checklist. I was told it was all right (in fact, required) to memorize NATOPS emergency procedures but that we must do the routine procedures by the checklist alone. I am a staunch advocate of the checklist. I insist that it be read aloud by the copilot and that the proper responses to the checklist be spoken by the person taking the required action.

But, thinking has its place in the cockpit also. If the pilot hasn't memorized the landing checklist, how will he know when the thick-thumbed copilot has inadvertently skipped a step on the list? If the pilot breaks his habit pattern by raising the gear at the 180 to take a long interval on straight-in traffic, will he remember to put the gear down again? Sure, we are supposed to return to that point on the checklist where we undo anything that we have done. But, obviously, some of us don't do that and it results in a wheels-up landing every now and then.

I think we should instill in all of our pilots some quaint phrase like CHOP, PROP, DROP that they are required to repeat to themselves at a particular position in the landing pattern; this being in addition to the normal use of the checklist. Nothing as rhythmic or rhyming as CHOP, PROP, DROP comes to mind.

Incidently, my friend with the battery problem hasn't left anything on in the parking lot lately. He now uses his "LIGHTS" sign to remind him to think before he leaves his car in the morning. He doesn't just turn off the lights because the sign says to. He sits there for a brief period and thinks about all the things that he has turned on during the trip, and then he systematically turns them off. He did almost have a nervous breakdown one evening when he left the office to go home. When he got to his car, he found that someone had stolen his new battery. ◄

Perhaps the greatest single factor that will help improve your chance of being rescued is – get to know your ship's helicopter crewmen! All helo crewmen are willing and able to come to your readyroom and make a SAR presentation. Some things your squadron should investigate thoroughly are:

- *Is your carabiner (D-ring) compatible with the helo rescue swimmer's rescue harness? This is an old, unresolved problem. Three of the five rescuees discussed herein had uncompatible carabiners!*
- *Can you reach all of your survival gear while floating around in your LPA? Try a swim with one inflated during your next shorebased safety standdown. The results may scare you to death!*
- *Are your PRC-90 and strobe light batteries good? That old dead battery will sure be a shock if you don't find it before your flight!*

Above all, remember that you as a survivor must share the responsibility for localizing your position in the water. Properly taped helmets and operable, accessible survival equipment are critical elements. If you assume you are spotted and sit back and wait to be picked up, you may be more than soundly shaken as the helo passes you by! The cost of PRC-90s, signal mirrors, strobe lights, and day/night and pencil flares for every aircrewman in the Navy is staggering. **Use them and . . .**

SURVIVE!

By LT Pete Blackwood
HS-15 Aviation Safety Officer

WOULD you believe that a man in the water 25 feet in front of a hovering rescue helicopter might not be seen? Would you believe that in the recent rescues of five aircrewmen at sea, all of them failed to employ the signal devices which are a part of every aircrewman's survival vest? Would you believe that your torso harness rescue fittings are NOT compatible with those on the rescue aircrewman's harness? Read on – you're in for a shock!!

As a helicopter pilot who has been involved in several rescue evolutions over the past 7 years, I have observed several adverse trends among downed aircrews which are of grave concern to me as a rescue pilot. I urge all aircrewmen to go back and review the basic survival techniques taught in DWST (Deep Water Survival Training).

Survival on the open ocean is a very harrowing experience for any aircrewman, but the recent helicopter rescues mentioned brought to light a number of facts which may some day be critical to YOUR survival. If you are forced to leave the security of your aircraft, here are some basic points to keep in mind to facilitate your rescue:

- Remain as calm as you can! Prepare for water entry. Remember your DWST. The procedures that you learned for inflating your LPA, deploying your seat pan/raft, and jettisoning your chute may save your life long before the thought of rescue can enter your mind. Once free of your chute, try to get well clear of it. It represents a hazard

to *YOU* and helicopter operations. Get into your raft if you can. It will make further efforts much easier.

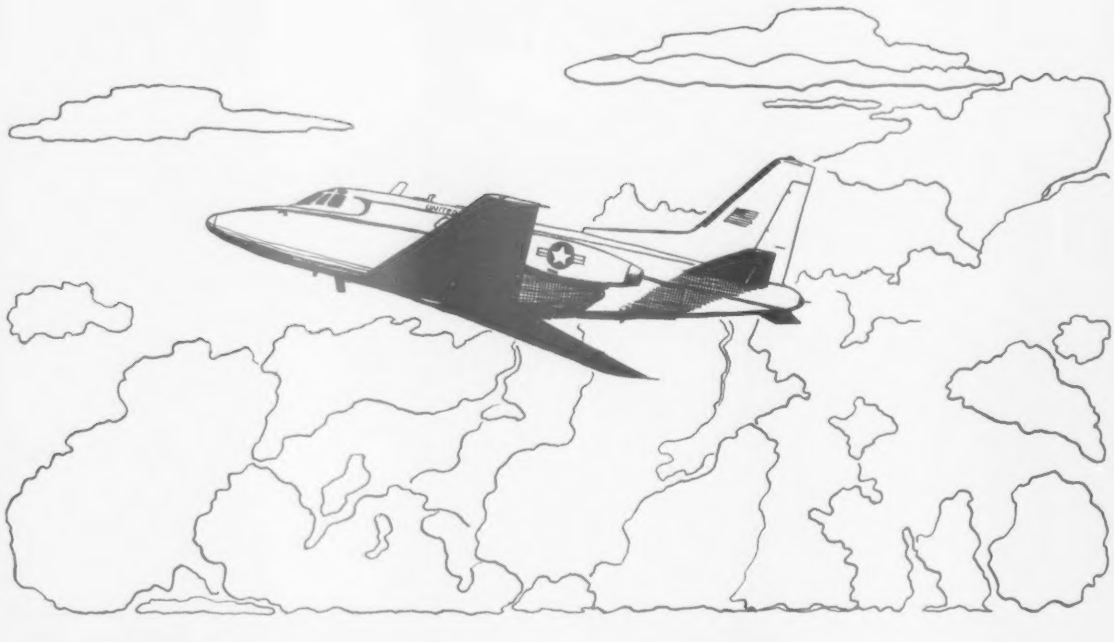
• Calmly locate your survival gear. Be certain you have your pencil flares, strobe light, signal mirror, and day/night smokes at your fingertips. No matter how close you think a helo is, turn on your strobe light and put it where it can be seen. Use your signal mirror if it is daylight. It is the best signalling device you have on clear days. If a helo is visible to you, fire two or three pencil flares at reasonable intervals. Use your PRC-90. Remember, these items are all designed to attract attention to your general position. *They do not function well as localizing tools!*

• When the helicopter is close at hand, utilize your day/night smokes to help pinpoint your position. *Never assume you have been seen!* Two of the five individuals being rescued were within 25 feet of the rescue helo and were *not* seen! This is particularly true at night, but it applies to daylight rescues as well (especially in high sea states).

• Abandon your raft only when the rescue helo is deploying its swimmer. Try to clear your raft. It is hazardous to helo operations, too. Then remember the rescue swimmer is the boss. He is trained to get you safely and expeditiously aboard the helo. *Do not try to help him!* Listen to and follow his instructions, and he will have you safely on your way home in no time.

Rank does not make right

By Anonymous Nugget



AS a newly designated naval aviator, I was looking forward very much to checking into my first assignment, a VR squadron. Completing the training syllabus with flying colors, I was designated a copilot, ready to hit the airways. What I didn't know at the time was that I was still afflicted with the training command syndrome of thinking the lieutenant with wings was never wrong. After all, didn't he have 2000 hours, a special instrument card, an ATP etc.? I flew with such an aviator on my first line mission.

Dropping off our passengers at Southeast NAS, I looked forward to a deadhead leg to our next stop 180 nm away. This would be the aircraft commander's hometown airport where his parents would pick us up, feed us a good old homecooked meal, and 3 hours later send us on our way for Homebase. Here's where the problem started.

Southeast NAS terminated fueling for the day. Fuel onboard was 1200 pounds. The aircraft commander decided to take off for Hometown airport. After all, it was his leg and he said it would be no sweat. I protested (meekly!). I was the new guy, right? No experience, so what did I know.

We taxied into position and held. Center advised there would be a 15-minute delay for takeoff. We held and burned down to 900 pounds. Still he said no sweat! We were cleared for takeoff, and Center held us at 4000 feet for the first 30 miles and then we climbed. Shortly after leveloff, both low fuel lights came on. Still he said no sweat. Needless to say, I was sweating profusely!

We pressed on, never declaring minimum or emergency fuel. We let down for Hometown airport and landed with both gages reading just above zero. A bingo profile or flameout approach was not flown. The only sensible thing the AC did all day was not using the thrust reversers. Fuel remaining onboard after shutdown was calculated to be 19 gallons. Had reversers been used, we probably would never have made it to the line.

Who is at fault here? I share the blame equally with the aircraft commander. He suffered severely from "get-home-itis," and I didn't adhere to one important rule for junior aviators: Don't stand on ceremony in the air! ◄

Our Readers Respond

F-4 Tailhook/Control Stick Binding

St. Louis, MO – Our attention was recently directed to an article by CWO3 J. C. Minnis in your JUN '77 issue ("Great Guns! Jammed, Binding, FODed, and Misrigged Flight Controls!") concerning flight control interference encountered during preflight. In the cited instance, the pilot checked his tailhook operation and control stick response more or less simultaneously and found binding in stabilator control. This was traced to the tailhook control cable hanging up on the lower right arm connection of the stabilator control bellcrank in the aft fuselage. In searching for reports of this occurrence, we found that the original UR that prompted mention in the article was improperly addressed to NAVPRO Long Beach (A-4s) instead of AFPRO St. Louis (F-4s) and so never reached the F-4 division of MDC. However, we did receive a later report – prompted by your article – that the Israeli Air Force had experienced a similar case of interference during preflight.

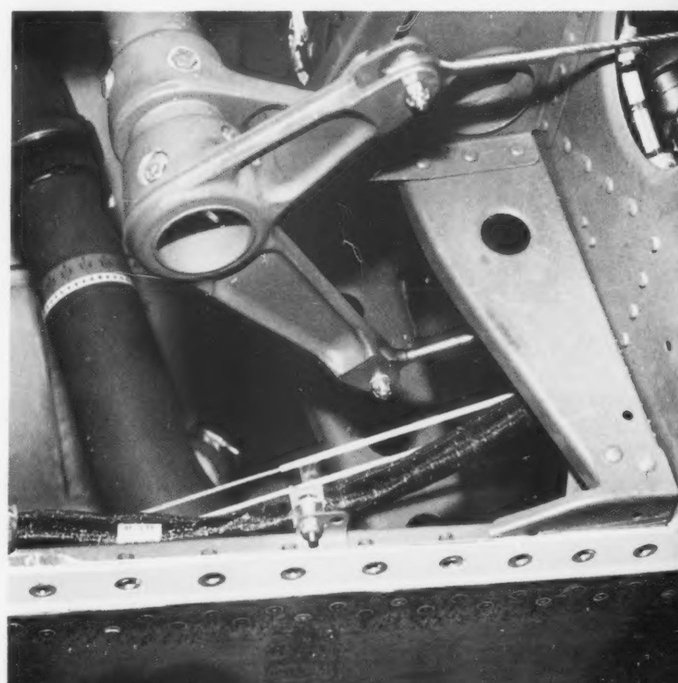
To evaluate the severity of the control system interference, we intentionally placed the tailhook control cable on the protruding castellated nut in the stabilator bellcrank connection (see photos). Then, with ground hydraulic power on the aircraft, the control stick was moved fore and aft. In each instance, the tailhook cable dropped off the nut, back to its normal position, on the first or second cycle of the stick. The pilot reported that he could detect no binding, nor could he feel a difference in friction with the tailhook cable on or off the bellcrank nut.

To obtain serious stabilator control system binding by this method, it appears that something abnormal is required. Perhaps in the reported instances, a nonstandard replacement or modification of the tailhook control cable had been made. If, for instance, the cable was installed so that the permanently attached sheathing ended at a point where its aft end lip could be hung up on the cotter key of the stabilator bellcrank attachment nut, a definite restriction would probably be felt. Even with this situation, however, application of minimal additional force would undoubtedly free the tailhook cable from the bellcrank. With the correct installation of the standard tailhook control cable P/N 32-65067-1, with sheathing attached, there should be no hazard involved in the rare case that the tailhook cable might temporarily hang up on the stabilator bellcrank.

If any readers have additional inputs on this subject, I would be pleased to hear from them.

R. D. Hunt, Chief System Safety Engineer
McDonnell Aircraft Company
St. Louis, MO 63166

Intentional placement of control cable on nut in the stabilator bellcrank connection.



Normal routing of control cables (cable sheathing partially removed).

Letters

New SAR Locator Light

Philadelphia, PA – After reading the DEC '77 issue of APPROACH, there may be a possibility that an item just evaluated here could be of some value to airmen who could be in a predicament such as the author of the article "Down in the Cold Atlantic." The item is called an Industrial Safety Lightstick. The method of packaging would be a problem, but if it were stowed in an impact-proof case and attached to a tether line to the survival vest, it would provide a readily accessible "beacon" light activated in seconds. We are in the process of procuring these lightsticks for emergency marking of ship egress in a casualty or power loss situation. Any further requests for information can be directed to Code 303, Philadelphia Naval Shipyard, Philadelphia, PA 19112.

Frank Streff
Operation Safety Advisor
Philadelphia Naval Shipyard

• Methods of increasing/improving survivor location at night are constantly being sought. Your recommendation has been discussed with cognizant personnel at the Naval Air Development Center, Warminster, PA. As a result, NADC is interested in assessing the feasibility of using the Industrial Safety Lightstick as a means to survivor location. Your recommendation has been forwarded to NADC Warminster for further study. Thanks for your interest in aviation safety.

C-9 Briefing Guide

Barbers Point, HI – On a C-9 flight as a passenger, I noticed that the brief card (NAVAIR 01-C9BAAA-1E) made no mention of the importance of extinguishing cigarettes in the event that the emergency system is activated. Smoking in an oxygen-enriched environment is obviously hazardous to your health. I strongly suggest the briefing card incorporate a "Warning."

LT Charles L. Butler
VC-1

• Good point. Your suggestion has been forwarded to our C-9 analyst for further action.

Spin Training: A Must

Patuxent River, MD – I salute LTJG Foster's article on "Spinning" (APR '78 APPROACH). He did a remarkable job in relaying an actual case where *realistic* training paid off and saved an aircraft. His candor is also lauded since I know of more than one squadron where out-of-control flight occurred and it was kept inhouse for fear of reprisal.

The subject of spin training has been a frustrating one over the years. We seem satisfied to expose a student pilot to a minimum of uncontrolled flight during basic training, and then after a considerable length of time, transition him to a tactical fleet airplane where we simply address spin avoidance. Emphasis appears to revolve around briefing ladder-list spin procedures, flight hour currency, ground training, and cursory high AOA/departure demonstrations. A high rate of unsuccessful spin recoveries continue to occur in recoverable airplanes where pilot disorientation is blamed. Contributing factors such as basic airplane flying qualities, unreadable instrumentation, and poor restraint should be addressed; however, overcoming the basic pilot disorientation through realistic training is safely and easily within reach.

Any pilot that is expected to operate in a tactical situation where uncontrolled flight can occur must be trained to handle departure/spinning flight. No amount of lectures, briefings, or simulators can totally prepare an aircrew for the stress and physiological experiences during a spin. Ground preparation is useful, but until we frequently rehearse in safe, spinnable airplanes, disconcerting uncontrolled flight will continue. Without realistic spin training, immediate and positive response cannot be ensured.

I have too often heard the weak argument that uncontrolled flight training in a suitable airplane is unsafe because 1) it will give aircrews a false appreciation of uncontrolled flight in his tactical airplane; 2) it will increase the risk of a mishap; and 3) spin training is not cost effective. I cite LTJG Foster's spin training and subsequent positive response as an example of what cost effectiveness and safe training is all about.

Years ago, as a spin demonstration pilot at the U.S. Naval Test Pilot School, I could clearly see the consistent initial disorientation even with highly experienced pilots. In a relatively short time, pilots

APPROACH welcomes letters from its readers. All letters should be signed though names will be withheld on request. Address: APPROACH Editor, Naval Safety Center, NAS Norfolk, VA 23511. Views expressed are those of the writers and do not imply endorsement by the Naval Safety Center.

became "tuned" to uncontrolled flight and also had a much greater knowledge and awareness of *how to avoid spins.* All tactical strike aircrew (NFOs included) must experience out-of-control flight under controlled conditions. Critics of such a program should take time away from the desk and try it. In the meantime, let's insist on tactical airplanes with honest spin characteristics, and let's conduct full scale Navy spin demonstrations early in a developmental program.

CDR J. K. Ready
Chief Test Pilot
Strike Aircraft Test Directorate
Naval Air Test Center

• See "Spin Training Comes of Age" in the MAY '78 APPROACH for current status of Navy spin training. Since LTJG Foster's article, another spin save attributed to the spin training program was recorded by VA-127.

More on the Option Approach

Point Mugu, CA – The definition for "the option" given in the Instrument Flying Quiz in the MAR '78 APPROACH disagrees slightly with the definition given in the Airman's Information Manual since the AIM definition states that the pilot may also execute a "stop and go."

Trivia? Probably so. However, our request for "the option" was recently denied at a west coast NAS on the basis of the AIM definition and a directive from higher authority which precluded the controller from issuing clearance for an intersection takeoff.

The controller reasoned that since an intersection takeoff was not authorized, then a "stop and go" was not authorized. Since clearance for "the option" by definition authorized a "stop and go," then "the option" itself was not authorized.

LCDR W. J. Rakowski, USNR-R
VP-65

• As part of our definition, we did omit the "stop and go" as one of the options. In this particular case, the controller was correct in denying the entire option approach because of the prohibited intersection take off.

Flicker Vertigo While Driving

NAS Willow Grove, PA – The effect described in the article "Strobe-Effect-Induced Seizures in Flight" (APR '78 APPROACH) has happened to me driving home from work. The road I take is lined with trees, and in the winter months when the trees are bare and the sun is setting, the strobe effect is annoying and can cause a headache. At my request I was issued tinted safety glasses with blinders on the sides. Since wearing these, I have had no problem with the strobe effect. I believe that if pilots were issued glasses with blinders it would help this problem.

Howard Feldstein
Aircraft Maintenance Dept.

• While your suggestion might help the strobe effect problem, "blinders" of any sort would severely cut down on the aircrews' field of vision. This would lead to a degraded lookout doctrine and an increased risk of midair collision. In this day of congested air traffic, midair collisions pose a significantly greater threat than strobe-induced seizures, so other methods of avoiding "flicker vertigo" would seem preferable.

The Old Visor Is Better

NAS Alameda, CA – Due to numerous scratches on my helmet visor, it became necessary to have a new one installed. With the new visor (which I've been informed is a different tint than the older ones), it is virtually impossible to see the aircraft instruments when the sun is in front of you. It is an effect similar to wearing polarized glasses in the cockpit. Although one is able to see outside the cockpit, the shaded area of the instruments become a hazy pale blue. I strongly recommend that the previous type visor be placed back into the system immediately!

LCDR D. O. Mason
VAQ-208

• NADC is interested in receiving aircrew comments concerning equipment. Contact the Crew Systems Division – Helmets, autovon 441-2845/2846.

Down and Locked

FPO, San Francisco – Your excellent article highlighting the importance of *coordination* in rendering assistance to an airborne emergency aircraft ("Too Much Talk . . .and Too Little Help," MAR '78 APPROACH) incorrectly tags those involved with a NATOPS violation. The accident boardmembers claim that the *Phantom* gear is likely to collapse if not blown down prior to generators shut down/engines secure. This is ludicrous! I find no mention in F-4 manuals of a requirement to pneumatically extend the gear in this type of situation nor evidence that it is *likely* to be necessary. In fact, the F-4B/N and F-4J NATOPS manuals actually say (under double generator failure), "If the landing gear is down and locked before loss of electrical power, do not blow the gear down." Many mistakes were made in the creation of this accident. However, extending the rollers by normal means was not one of them.

LT C. A. Bangert III
VF-151

• You are absolutely correct. Discussion with experts at the Oceana F-4 NAMTG and VF-171 (East Coast F-4 RAG) reveals that the *Phantom* has mechanical locking fingers on all three gears. If the pilot gets a good down and locked indication, these fingers will prevent collapse of the gear whether or not electrical or hydraulic power is removed. Thanks for bringing the accident board's erroneous conclusion to our attention.

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approach

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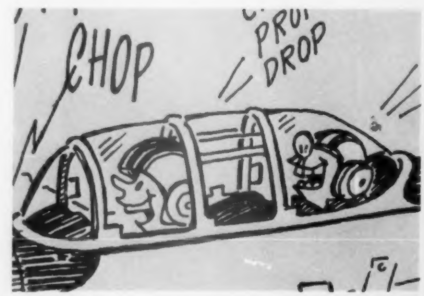

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DEPARTMENTS

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CREDITS/This month's cover depicts the carrier-based E-2 *Hawkeye* which provides the Fleet with varied and sophisticated electronic capabilities. The painting is by Craig Kavafes, courtesy of Grumman Aircraft Corp. Pg. 9 Diagram courtesy McDonnell-Douglas Aircraft Co.; Pg. 19 Photo by PH3 Dave Carlson; Pg. 29 Photos courtesy McDonnell-Douglas Aircraft Co.

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NAVAIRLANT	NAVAIRRESFOR	NAVAIRPAC
VF-74	**VF-301	VF-211
VA-37	VFP-306	VA-147
VA-35	VA-303	VA-165
VA-45	**VP-92	**VA-128
RVAH-7	VR-52	VAQ-138
RVAW-120	HC-9	VAW-115
**VS-22		***VS-21
VP-26		VP-48
HS-11	**4th MAW/MARTC**	HS-6
VRC-40	VMA-131	**HC-3
HSL-34	HMM-774	VX-4
FMFLANT	**CNATRA**	**FMFPAC**
VMA-223	**VT-6	VMA(AW)-121
VMAQ-2	**VT-19	**VMFA-212
HMT-204	VT-10	**HML-267
H&MS-31	VT-22	HMM-165
	VT-24	HMH-463

**Second consecutive year
***Third consecutive year

Admiral James H. Flatley Memorial Awards

USS SARATOGA	CV-60/CAG-3
USS CORAL SEA	CV-43/CAG-15
USS OKINAWA	LPH-3/HMM-165
USS LEXINGTON	CVT-16 (special)